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ABSTRACT

"Tech prep" is the term given to vocational education programs that provide preparation for technical careers. These programs often include an articulated curriculum of 2 years of high school and 2 years of postsecondary education with work experience components. This report describes tech prep as it currently exists, based on data collected from nationwide visits to secondary and postsecondary institutions, participation in conferences, and an extensive literature review. The report conta[illegible] four sections. The first section examines the social framework i[illegible]h vocational education operates, including the economic and s[illegible]al forces that have shaped the tech prep movement. The second section describes current tech prep programs. Four components common to most of the tech prep programs are identified: information/marketing campaigns; curriculum development; career guidance; and program improvement. The third section provides information on establishing articulation agreements. The final section reviews the basic structural issues underlying the delivery of education, including federal and state policies and relationships. A list of 59 references is included. Appendixes, which make up more than half the document, include the following: a list of conferences attended, site visits made, and documents reviewed; sample brochures, newsletters, and student handbooks; counselors'/teachers' manuals from various tech prep programs; summer institute and conference agendas; drafting program description from two colleges; a career center description and career planning form; articulation agreements; mission statements; and a copy of the Tech Prep Education Act of 1990. (KC)

BEYOND ARTICULATION: THE DEVELOPMENT OF TECH PREP PROGRAMS

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INTRODUCTION

The articulation of vocational education courses is not a new idea. Interest in coordination between educational levels has been evident for more than sixty years.[1] In part, this interest remains active because articulation offers many benefits to students, educational institutions, and the community at large. For instance, the frequently cited advantages to students include better preparation for work, the opportunity to earn college credit for secondary courses, the elimination of duplicate coursework, and a more efficient use of their time and money. Some researchers (Carter, 1985; Mitchell, 1989) also argue that an advantage for secondary students is increased self-esteem and motivation from earning college credit.

For educational institutions, one of the major advantages of articulation is increased student recruitment and enrollment. The possibility of advanced placement in a community college can increase enrollment in articulated classes at the secondary level, and the opportunity to enroll in programs that allow students to develop broad-based competencies in an occupational program area can increase retention at the postsecondary level. Finally, articulated programs provide benefits to the community at large. For instance, by reducing duplication of coursework they provide an effective means of confronting decreased funding for education and increased demands for accountability. In turn, providing more effective programs enhances the public image of the institution and encourages local employers to recognize program graduates as a source of well-trained employees.

Recent interest in articulation reflects the pursuit of a relatively new concept: tech prep—the development of vocational education programs that provide preparation for technical careers.[2] In part, this pursuit is the response of education, government, and

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[1]The topic of articulation has a long history of being investigated by members of the educational community. Included in this history are a number of investigations in vocational education that are both comprehensive and modest in scope (i.e., based on national and statewide samples of postsecondary institutions). The most widely cited comprehensive studies include Bushnell (1978); Long, Warmbrod, Faddis, and Lerner (1986); McCormick (1980); McKinney, Fields, Kurth, and Kelly (1988); and Woelfer (1978). A sample of recent statewide studies include Pennsylvania (Carter, 1985); Maryland (Radcliffe & Zirkin, 1986); Illinois State Board of Education (1987); Massachusetts (McDonagh, 1988); Washington (McClure, 1988); Delaware Statewide Vocational-Technical High Schools (1989); North Carolina State Department of Community Colleges (1990); Texas (Lovelace, 1990); and California (Ramer, 1991).

[2]In *The Unfinished Agenda*, the National Commission on Secondary Vocational Education (1984) proposed, among other things, the expansion of cooperative endeavors in secondary schools. Specifically, "secondary and postsecondary levels must coordinate their programs. The tech prep curriculum being

business leaders to the significant economic, technological, and social changes of the 1980s including (1) structural changes in the economy linked to less industrial production jobs, more service industry jobs, and a demand for trained technicians; (2) rapid technological changes in the workplace that require a variation in job skills; (3) a decrease in the population aged sixteen to twenty-four that typically fills entry-level jobs, but a larger percentage of disadvantaged and minority youth who need special help to compete in the job market; and (4) an increase in older workers needing training and retraining.

Assuming that the public education system is the key instrument for preparing the workforce for successful participation in our changing labor market, the implications of these changes are significant. Educators and policymakers must design curriculum and enact legislation that together support training and retraining of all citizens for occupational placement or job replacement. At the same time, however, critics argue the education system itself must be reformed in order to meet these challenges. For instance, the educational system is often criticized because high school graduates lack basic skills and adequate literacy levels, secondary vocational education tends to provide a narrow occupational preparation for students, and postsecondary technical institutions report losing fifty percent of their students from semester to semester (Budke, 1988).

In response to these criticisms, and to the need for providing effective workforce preparation, many education and business professionals have joined together to pursue a new direction in vocational education. This direction is characterized by a renewed sense of service to students and community, a demand for educational excellence, and a need to get the most out of shrinking finances at a time of declining enrollments. Most importantly, it reflects an understanding of the impact of new technologies on technical occupations, and a need to provide students with appropriate training to meet the accompanying changes in skill requirements. This new direction is also supported by the federal government. In particular, as part of the reauthorization of the Carl D. Perkins Vocational Education Act of 1984, national policymakers enacted the Tech Prep Education Act of 1990 and allocated over $63 million to promote "the development and operation of articulated 2+2 programs."

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developed in many communities between high schools and community colleges illustrates how this can be done effectively" (p. 18).

Given the widespread support for this new direction in vocational education, it is important to ask "What is tech prep, and why has federal legislation been enacted to support the development of these programs?" The purposes of this report are to answer these questions and to describe the current state of affairs of tech prep programs. These descriptions are based on data collected from nationwide site visits to secondary and postsecondary institutions, participation in numerous tech prep conferences, and an extensive review of the literature including program documents, ERIC files, and academic publications. (See Appendix A for a list of schools visited, conferences attended, and published program material reviewed.)

These research activities indicate there are many successful programs. Furthermore, program variation tends to reflect differences in planning and implementing processes, and differences among individual schools, students, and local economies. Although no single type of tech prep program can be responsive to the variations among schools, there are four general components that serve as the foundation for all programs: (1) information/marketing campaigns, (2) curriculum development, (3) career guidance, and (4) program improvement. Furthermore, tech prep programs can be described on the basis of changing activities and priorities associated with these components. An overview of these changing activities is presented in Table 1. The material in this table illustrates the three open-ended stages of program development that typically characterize tech prep. In general, tech prep programs, or the activities and priorities of each program component, do not change simultaneously from one stage of development to the next—beginning, intermediate, and advanced. Rather, tech prep programs reflect a mixture of *each* component operating at various stages of development. As a result of proceeding through stages of development, the current status of tech prep reflects a range of programs. For instance, some tech prep programs can be described as a combination of the following components: (1) intermediate marketing campaign, (2) beginning course development, (3) intermediate career guidance, and (4) beginning program improvement.

In an effort to understand these recent developments in tech prep programs, and the current interests of education, business, and government leaders in a new direction for vocational education, this report presents the following four sections and the accompanying appendices.

The first section presents an examination of the broad social framework that vocational education operates in. Included in this section is a discussion of the economic, technological, and social forces that provided the impetus for many education reforms in the 1980s such as tech prep programs. Following an understanding of the context for change, the material in the second section presents a detailed discussion of current tech prep programs. The purpose of this section is to describe the continuum of activities associated with each program component at the three stages of development.

In recognition that effective planning and implementation of tech prep programs begins with a clear understanding of articulation processes and organizational structures, the third section presents (1) an overview of the processes for establishing articulation agreements, (2) a discussion of the barriers to these agreements, and (3) a description of the committees that coordinate the articulation activities and form the organizational structure for all tech prep programs. Although there is no required number of committees, there is a relationship between the components of tech prep programs, the stages of program development, and the organizational structure. Given the many activities and changing priorities associated with each program component, the organizational structure typically includes the following committees: (1) executive, (2) administration and coordination, (3) curriculum, (4) staff development, (5) marketing, and (6) program improvement.

Finally, in the fourth section, the examination of current tech prep programs concludes with a review of the basic structural issues underlying the delivery of vocational education. The purpose of this section is to present the issues related to how states govern and administer vocational education, and how federal policies are filtered through these structures. In turn, this material addresses the questions of how state initiatives and federal policy inhibit or facilitate the development of tech prep programs.

Table 1

The Evolution of Tech Prep Programs:

Development Stages of Program Components

PROGRAM DEVELOPMENT STAGES	PROGRAM COMPONENTS			
	Information/Marketing Campaign	**Course Articulation and Curriculum Development**	**Career Guidance**	**Program Improvement**
Beginning	Initiate small-scale "spread-the-word" campaign	Articulation of currently *existing individual* courses in vocational-technical program areas	Establish Career Guidance Center (e.g., rearrange offices, upgrade equipment)	Identify outcome indicators (e.g., enrollment figures) and context and process indicators (e.g., student satisfaction with curriculum); establish baselines; informally collect information
Intermediate	Establish a formal/written marketing plan; identify all target audiences; develop and implement a sequence of specific marketing activities	Articulation of *modified* courses and *course sequences* in voc-tech program areas	Expand career development program at secondary level (grades 7-12)	Formalize system for collecting data; review and expand indicators as needed
Advanced	Engage in major marketing campaign; disseminate widely program description and outcomes; expand permanent program activities	Articulation of completely *new courses, course sequences,* and the development of voc-tech and academic *core curriculum*, and programs that provide training along a *career ladder*	Integrate career development programs to all school levels (grades K-14)	Routinely analyze program improvement data; revise components as needed; publish results

CONTEXT FOR CHANGE: THE FRAMEWORK FOR DEVELOPING TECH PREP PROGRAMS

To understand recent developments in vocational education and renewed interests in articulated programs it is important to examine the broad social framework that vocational education operates in. This examination is important because the framework, composed of economic, technological, and social forces, represents the context for change in secondary and postsecondary vocational education. Given the significant influence of these contextual forces, the purpose of this section is to describe the link between the current social framework and the development of tech prep programs.

The Framework: Economic, Technological, and Social Forces

It is generally thought that a strong educational system contributes to the economic health of a country, state, or region. The link between the quality of education and economic development is accomplished through labor productivity. Industries rely on the comparative expertise of educators to provide potential employees with knowledge of basic job skills and training for specific occupations. In short, the prospect for future economic growth is related to the importance of meeting national educational requirements.

The educational requirements of current and future jobs reflect the changing economic base and job market. In the past, the economic base primarily reflected the output of smokestack industries and goods produced in the industrial sector. Furthermore, these industries used a high volume manufacturing system and employed a significant number of relatively unskilled workers. Over the last decade, these manufacturing jobs have decreased as industries adopted a new flexible system of production, characterized by technological innovation, precision manufacturing, and customization of products. In turn, there has been a greater demand for new styles of management, and an emphasis on teamwork and problem solving instead of hierarchy and routinization (Personick, 1989), a conclusion also reported by members of the Secretary's Commission on Achieving Necessary Skills (SCANS). Based on interviews with representatives of the nation's schools, businesses, unions, and government, the Commission reported that "in high performance workplaces work is problem-oriented, flexible, and organized in teams; labor is not a cost but an investment" (U.S. Department of Labor, 1991, p. 3).

As a result of these changes, the United States continues to experience major shifts in employment from traditional manufacturing and blue-collar jobs to the service sector, white-collar occupations, and new manufacturing areas. In addition, many of the changes in the older, declining industries are associated with the increased use of automated equipment and the introduction of completely new technologies and occupations. For instance, new production industries are rapidly growing and requiring expertise in the high technology fields such as computers and microprocessors, lasers and fiber optics, robots and flexible manufacturing, and biotechnology and automated information processing equipment.

The start up of new production industries has been accompanied by changing production processes, the creation of a need for highly specialized skill development, and greater individual employment flexibility and adaptability. In response to these production changes and new job requirements, education and training programs must (1) be directed toward the development of applied math and science knowledge, as well as technical skills and concepts required for current specialized occupations, and (2) be capable of adapting to ongoing labor market changes and future job opportunities (Budke, 1988; Kutscher, 1989). In short, these programs must prepare workers effectively for specific jobs, but also for adaptation to new job environments and occupational requirements. The following conclusions were also presented in the SCANS report: "across the country and in every kind of job: good jobs depend on people who can put knowledge to work. New workers must be creative and responsible problem solvers and have the skills and attitudes on which employers can build" (U.S. Department of Labor, 1991, p. v).

Among the major occupational groups projected to show faster than average rates of growth over the 1988-2000 period are technical and related support occupations; professional specialty occupations; and executive, administrative, and managerial occupations. In addition, two other occupational groups are expected to show faster than average growth—service occupations and marketing and sales occupations. The groups with the slowest rate of projected growth include operators; fabricators; and laborers in the agriculture, forestry, and fishing occupations. (See Table 2, "The Fastest Growing Occupations, 1988-2000," and Table 3, "The Occupations with the Largest Job Growth, 1988-2000.")

Table 2
Fastest Growing Occupations, 1988-2000
(number in thousands)

Occupation	Employment 1988	Employment 2000	Numerical Change	Percent Change
Paralegals	83	145	62	75.3
Medical assistants	149	253	104	70.0
Home health aides	236	397	160	67.9
Radiologic technologists and technicians	132	218	87	66.0
Data processing equipment repairers	71	115	44	61.2
Medical records technicians	47	75	28	59.9
Medical secretaries	207	327	120	58.0
Physical therapists	68	107	39	57.0
Surgical technologists	35	55	20	56.4
Operations research analysts	55	85	30	55.4
Securities and financial services sales workers	200	309	109	54.8
Travel agents	142	219	77	54.1
Computer systems analysts	403	617	214	53.3
Physical and corrective therapy assistants	39	60	21	52.5
Social welfare service aides	91	138	47	51.5
Occupational therapists	33	48	16	48.8
Computer programmers	519	769	250	48.1
Human services workers	118	171	53	44.9
Respiratory therapists	56	79	23	41.3
Correction officers and jailers	186	262	76	40.8

Table 3

Occupations with the Largest Job Growth, 1988-2000

(number in thousands)

Occupation	Employment 1988	Employment 2000	Numerical Change	Percent Change
Salespersons, retail	3834	4564	**730**	19.0
Registered nurses	1577	2190	**613**	38.8
Janitors and cleaners	2895	3450	**556**	19.2
Waiters and waitresses	1786	2337	**551**	30.9
General managers and top executives	3030	3509	**479**	15.8
General office clerks	2519	2974	**455**	18.1
Secretaries (except legal and medical)	2903	3288	**385**	13.2
Nursing aides, orderlies, and attendants	1184	1562	**378**	31.9
Truck drivers, light and heavy	2399	2768	**369**	15.4
Receptionists and information clerks	833	1164	**331**	39.8
Cashiers	2310	2614	**304**	13.2
Guards	795	1050	**256**	32.2
Computer programmers	519	769	**250**	48.1
Food counter, fountain, and related	1626	1866	**240**	14.7
Food preparation workers	1027	1260	**234**	22.8
Licensed practical nurses	626	855	**229**	36.6
Teachers, secondary school	1164	1388	**224**	19.2
Computer systems analysts	403	617	**214**	53.3
Accountants and auditors	963	1174	**211**	22.0
Teachers, kindergarten and elementary	1359	1567	**208**	15.3

Source: Silvestri and Lukasiewicz (1989).

In view of the fact that the skills of an increasing number of workers are becoming obsolete, how will the current and future demands of the labor market be supplied? Where will employers find the individuals with the necessary education and training to fill the available jobs? These are increasingly important questions for those concerned about the potential imbalance between the educational preparation of individuals entering the labor force and the skill preparation requirements of most industries. In part, this concern is based on a review of the major demographic shifts in the United States over the last decade, and a recognition that these changes shape all aspects of our educational system. For instance, a major challenge for educators and policymakers is to provide programs that ensure equity, access, and quality for an increasingly diverse population—diversity that reflects the aging of the population and an increase in minority populations.

In terms of the age distribution of the labor force, the two most important compositional changes are the aging of the workforce and a decline in the number of individuals sixteen to twenty-four years of age. To support this, the Bureau of Labor Statistics (BLS) reports that, for the first time in U.S. history, there are more people sixty-five years old and over, more than sixty million people are between the ages of thirty and forty-four, and until the mid-1990s there will continue to be a decline in the population between sixteen and twenty-four years of age (Kutscher, 1989). As a result, there is an increased need for adult education and vocational programs to train new employees to replace the increasing number of retiring workers who have critical technical skills. In addition, industries that recruit primarily young entry-level workers will be competing for declining numbers in these age groups.

The composition of the labor force also reflects increased rates of growth of women and racial/ethnic minorities. For instance, between 1988-2000, the rate of growth for women in the labor force is expected to be double that for men (Kutscher, 1989). In addition, by the year 2000, African Americans are expected to increase their share of the workforce by 1.9%, Hispanics by 4%, and Asians by 3.6%. Unfortunately, these gender and racial changes also indicate an increase in those groups that have historically been crowded into occupations with low-wages and no mobility. These groups are also more prone to drop out of high school, and are more likely to experience higher rates of unemployment and lower earnings throughout their life. In addition, these changes are occurring at the same time that the jobs showing the fastest rate of growth are requiring higher levels of education (although most do not require a bachelor's degree).

The Social Context of Tech Prep Programs

The relationship between these dynamic economic, technological, and social forces and recent calls for reevaluation and reform of vocational education programs is created because one means of assuring future productivity growth is to meet our economy's educational requirements.[3] Furthermore, the most rapid rate of job growth is among technician jobs that require some training at the postsecondary level, and the purpose of vocational education is to offer programs that develop such occupational skills.

Faced with the need to support productivity, the rapid growth in new production industries, and the changing composition in the workforce, federal policymakers, educators, representatives from vocational education associations, and business leaders have called for reforms in vocational education. For instance, federal policymakers began a significant effort in 1984 following the publication of *The Unfinished Agenda* by the National Commission on Secondary Vocational Education. Funded by the Office of Vocational and Adult Education, the Commission conducted an evaluation of vocational education programs in response to national reports documenting the deficient academic preparation of students and the need for school reform. Following their evaluation, the Commission concluded that improved secondary vocational education is based on building stronger ties between vocational and academic education to maximize learning and career opportunities. Specifically, the Commission stated,

> secondary schools must offer vocational programs that provide students with theory and application of academic material, the development of general employability skills, training in specific occupational skills, and career guidance. These programs should also provide students with a thorough awareness of career development before entering high school, and ensure a smooth transition to postsecondary institutions in order to continue their training. A transition . . . is fostered through articulation efforts such as coordinated *tech prep* curriculum. (p. 18)

[3]The rate of growth of national productivity is an integral factor in the United States remaining competitive. Furthermore, the globalization of many manufacturing and service markets means the United States must remain competitive in order to sell our products abroad and also to ensure that American goods have an equal chance in domestic consumption. The prospect for productivity growth is related to several factors including education and training of the labor force, research and development, new technological equipment, capacity utilization, and energy prices (Kutscher, 1989).

The Commission concluded that continuing education options for secondary students should be developed at the state level and include the collaboration of business and industry representatives because they will help keep the subject matter current and relevant.

During the 1980s, in agreement with the efforts of federal policymakers, several proposals were presented by educators and vocational associations for "a new concept in articulation" and programs for technical preparation (American Vocational Association, 1984, p. 38; Parnell, 1984, 1985). The concept reflected the position that vocational education and training programs are greatly influenced by technological forces. As a result, Parnell (1984, 1985) focused on the influence of specific technical occupations that require a "middle range of skills" and proposed an educational program leading to a tech prep associate degree.

The initial design of tech prep programs proposed by Parnell (1985) reflects a planned link between two or more educational systems. He proposed that tech prep programs begin in eleventh grade and require a core curriculum of coursework in math, science, communications, and computers. The purpose of these educational programs was to prepare students for entry-level jobs as technicians. Parnell's (1984) support for this preparation is reflected in the following statement:

> The decline of manufacturing industries and the rise of information service operations have created more jobs that increasingly require the employee to be familiar with computerized operations and to possess skills previously required only by employees with baccalaureate degrees. (p. 2)

In agreement with policymakers and educators, business leaders also responded to the changing economic, technological, and social forces, and supported reforms in vocational education. For instance, in 1984, business and government leaders in twelve southern states formed the Southern Growth Policies Board to address the issues associated with integrating new scientific discoveries and technological innovation with traditional thinking about economic development. A year later the Southern Technology Council was established to mobilize support for a variety of initiatives that emphasize the importance of technology-related issues for providing answers to the questions of how to increase per capita income, reduce poverty, and reduce unemployment? By 1988, the Council members presented their answers to these questions. The members, including representatives from business, industry, and education (e.g., Bell South, Middle South

Utilities, the Institute for Technology Development in Mississippi, and the Southeastern Universities Research Association), presented a plan of action for the future of science and technology policy and programs for the region (Southern Growth Policies Board, 1989).

In response to these initiatives, the Southern Regional Education Board (SREB) recommended that state vocational education departments establish standards for integrating math and science competencies in their programs, monitoring outcomes, and reporting progress. In addition, the Southern Technology Council recommended that high school and community college administrators should work together to ensure a smooth transition between educational institutions because the responsibility for teaching higher-order technical occupational skills has shifted to two-year colleges. To meet this recommendation, the Council supported the assessment of existing programs that provided this transition such as an assessment of the tech prep programs in Richmond County School District (1990), North Carolina.

As a result of these efforts by federal policymakers, educators, and business leaders, by the late 1980s many curriculum changes had occurred in secondary and postsecondary institutions. In particular, over thirty-four state representatives reported the establishment of tech prep programs between various secondary and postsecondary institutions (Tri-County Technical College, 1989). Some states also mandated the use of competency-based vocational education curriculum and the development of articulated programs between secondary and postsecondary institutions (e.g., Delaware, Indiana, and Oregon). In addition, federal legislation was enacted to provide funding for the articulation of tech prep programs.

In 1990, the 101st Congress included the Tech Prep Education Act in the reauthorization of the Perkins Vocational and Applied Technology Education Act. As stated in the Tech Prep Education Act,

> in recognition of the recent changes in the labor market, and the challenge of worldwide economic competition, there is a significant need to prepare youths for success in the ever changing technological workplace. This preparation can be provided through a 4-year educational program grounded in the development of comprehensive instruction based on articulation agreements between secondary and postsecondary institutions. (pp. 38-39)

Federal support for the development of articulated curriculum is not new; however, the significance of the Tech Prep Education Act is that national legislation supports a renewed effort to create technical preparatory curricula based on current effective articulation programs between secondary and postsecondary institutions. Ideally, the Tech Prep Education Act promotes the development of curricula that can enhance the learning process, strengthen relationships among secondary districts, postsecondary institutions, job training agencies, and local employers, as well as increase the rates of student retention and the successful entry of students into work or postsecondary education. With these advantages in mind, the purpose of tne next section is to review the continuum of current tech prep programs.

COMPONENTS OF TECH PREP PROGRAMS

Recent efforts to articulate differ from previous efforts in the renewed focus on student concerns, in the widespread use of competency-based curriculum, and in the adoption of new courses at both secondary and postsecondary institutions that incorporate either basic skills or applied academics. The adoption of these new courses is enhanced by the availability of curriculum from publishers and other sources such as the National Curriculum Centers, State Departments of Education, Divisions of Vocational Education, the Vocational-Technical Education Consortium of States (V-TECS), and the Center for Occupational Research and Development (CORD).

It is evident from current observations that these efforts are reflected in the variety of tech prep programs offered at various secondary and postsecondary institutions. The purpose of this section is to describe these programs. The descriptions suggest some general approaches to tech prep and indicate that program variation reflects differences among individual schools. Each school decides what works best for their students and in their community. For example, one school may articulate business courses because it has high enrollments in the subject, another may rework science courses because a significant number of jobs are projected in related industries. Furthermore, the need to articulate is often determined by such factors as whether a school is located in rural, suburban, or inner city areas; whether it is an area vocational, comprehensive, or magnet high school; and whether it serves a large, medium, or small student population with or without a percentage

of special needs students. In short, a single type of tech prep program cannot be responsive to the interests of all students; the attitudes of teachers, counselors, and administrators; the needs of an entire community; or the available resources.

Although no single type of tech prep program is appropriate, in every case there are four general components that serve as the foundation for all programs. These components are (1) information/marketing campaigns, (2) curriculum development, (3) career guidance, and (4) program improvement. Furthermore, although there is program variation among individual schools, most administrators would agree their programs reflect agreement with Parnell's definition of the tech prep concept first introduced in *The Neglected Majority* (1985), and later defined in greater detail with Hull and Parnell (1991) in *Tech Prep Associated Degree: A Win/Win Experience*:

> A Tech Prep/Associate Degree Program is the technical education alternative to college prep. It is targeted for, but not limited to general education high school students, the forgotten half. A Tech Prep/Associate Degree program rests on a foundation of applied academics, courses that incorporate real-life applications and hands-on experience into the teaching of academic subjects. A Tech Prep/Associate Degree program is a carefully designed curriculum that engages a high-school student in a four-year (2+2) or six-year (4+2) plan to gain the competencies (knowledge, skills, and values) required for technical careers. (p. 46)

Given the identification of the four general program components, the purpose of this section is to describe how various tech prep programs differ on the basis of changing activities and priorities associated with the components. An overview of these changing activities is presented in Table 1. As stated in the introduction, these components are identified on the basis of recent site visits and observations of currently operating programs; an exhaustive review of the literature; and participation in several national, state, and local conferences on tech prep. The material in this table illustrates the three open-ended stages of program development that typically characterize tech prep. In general, tech prep programs, or the activities and priorities of each program component, do not change simultaneously from one stage of development to the next. Rather, tech prep programs reflect a mixture of *each* component operating at various stages of development. In short, all the components are considered equally important and a genuine effort is made to initiate activities under each one. A description of each program component follows.

Component #1
Information/Marketing Campaigns:
Provide information to all audiences impacted by the program.

The purpose of information/marketing campaigns is to "spread the word," inform audiences, and promote student enrollment in articulated courses. As tech prep programs evolve and "take root," the purpose of these campaigns includes a focus on larger issues such as the goals of vocational education and the relationship between selected course offerings and technical career opportunities. As with each component, information campaigns change over time. They vary on the basis of the approach selected for planning and implementation and the activities selected to constitute the campaign. For instance, a campaign can be carried out by administrators at the postsecondary institution, by personnel in the district office, by a committee or task force, or by an outside specialist hired as a consultant. In addition, the selected marketing activities may be singular or multiple, and may take place during the entire year or coincide with specific events during the school year.

In general, marketing campaigns are composed of activities related to four broad categories: media (print and nonprint), visitations/demonstrations, presentations, and promotional events/activities. These categories and relevant examples are listed in Table 4, "Marketing Activities for Tech Prep Programs." The material in this table does not represent an exhaustive list; however, it does represent the variety of activities observed in current programs. Furthermore, the purpose of the following discussion is not to describe each item in the table, but to describe the most common forms of information/marketing activities observed in tech prep programs at each stage of development.

Stage One: Beginning Programs

Information campaigns are often initiated by postsecondary personnel who are responsible for planning and implementing articulation agreements. At the beginning stage of program development, these personnel help organize the following activities. First, a promotional logo is designed for tech prep programs. This logo is used on all subsequent materials to help build easy recognition of the programs. Second, a variety of promotional items and/or printed materials are prepared and used to spread the word about the program. At this stage, the target audience is often limited to secondary and postsecondary students and staff, and the material is distributed during regularly scheduled school events and in

highly visible locations (e.g., in the career development center and during course registration).

The most common forms of printed material and promotional items are foldout brochures, bumper stickers, posters, and t-shirts. In most cases, the promotional items "announce" simple phrases such as "2+2 Equals Success," "Earn College Credit with 2+2," "2+2: A Student's Key to Success," or "A Career in Technology is as Easy as 1, 2, 3." For example, personnel at Fresno City College (in California) use a variety of posters with caricatures of students proclaiming the benefits of FCC's 2+2+2 programs. For instance, in one poster, three students are shown in cap and gown, and at the top of the poster is the phrase "With 2+2+2, we know where we're going," at the bottom is "College begins before high school ends with 2+2+2."

Although promotional items are not used in every school, all schools do use foldout brochures. In most cases, during the beginning stage of program development, the content of the brochure addresses a few general questions such as, "What are tech prep programs?" "Why are there tech prep programs?" and "How do you enroll in tech prep during high school?" These questions are answered in short paragraphs or with checklists. For instance, some answers to the question "What is tech prep?" include

(1) Tech prep equips students with the skills and competencies necessary to meet employers' expectations not only for entry-level jobs, but also for career advancement. It prepares students with the basis for a lifetime of learning. (Illinois State Board of Education)

(2) 2+2 tech prep and V.I.P. (Vocational Inter-District Program) can provide you with: a planned sequence of technical classes in grades 11 through 14, the opportunity to receive Mt. Hood Community College credit for technical skills learned in high school, the opportunity to shorten the time necessary to earn an Associate degree. (Mt. Hood Community College, Gresham, Oregon)

(See Appendix B for a complete copy of these sample brochures.)

A primary objective of the initial information campaign is to address the educational needs of students, and to encourage their enrollment in articulated classes. In addition, the personnel responsible for marketing tech prep programs often plan activities to help promote good communication between faculty and staff who are or will be involved in

Table 4

Marketing Activities for Tech Prep Programs

Media		Visitations/ Demonstrations	Presentations	Promotional Events and Activities
Print	Nonprint			
Flyers	Videos	Student visits to businesses and schools (vocational facilities, guidance center)	Outside speakers to schools	Items with tech prep program logo
Posters	Cable TV	Parents to schools (vocational facilities and guidance center)	Seminars	Career days/ open house
Newsletters	Radio	Teachers and guidance counselors visit schools and businesses	Speakers bureau	Parent/student career dinner
Fact sheets				Awards ceremonies
Handbooks (students, parents, counselors)				Student competitions (e.g., vocational Olympics
				Mall displays

the articulation processes and outcomes. For instance, some school districts finance "introductory dinners" to promote communication and cooperation between various personnel including faculty, staff, and administrators. Or, a joint workshop is planned for high school and community college counselors and placement officials to improve the coordination of student career development and planning activities. In general, a major goal of all the early marketing campaign activities is to promote a positive image of tech prep programs. This goal, while perhaps obvious, cannot be reached without a firm commitment to program development.

Stage Two: Intermediate Programs

As the availability and purpose of tech prep programs becomes more familiar to students, faculty, and counselors, the scope of the marketing campaign is expanded. During this stage of program development, the purpose of the marketing campaign is to provide *more* information to *more* audiences. For instance, new or revised program brochures are printed, and the number of target audiences are increased to include parents, business representatives, and members of the community at large.

In most cases, the selected activities of an expanded marketing campaign are the outcome of a three-step planning process: (1) a marketing committee is formed; (2) all appropriate target audiences are identified; and (3) a sequence of activities is developed and implemented for the targeted audiences. In short, a systematic plan is established that includes written agreements for various activities that are evaluated and revised as needed.

The process of planning a systematic marketing campaign begins with the formation of a marketing committee. In most cases, the committee members are representatives from the school and the community including high school and community college faculty, guidance counselors, students, parents, public relations specialists, and business personnel managers. These members generate ideas and, most importantly, they represent a network of resources that provide information on such things as cost-competitive printing.

The second step in the planning process is to identify target audiences and determine their perceptions of vocational education programs. The reason for this step is that each audience is unique and the more specific the group's definition the more it responds to certain marketing activities. For example, the target audiences for tech prep

programs include individuals in the school (students, teachers, guidance counselors, and administrators) and the community (parents, business, industry, and labor personnel). Furthermore, the student audience includes at least secondary students in grades 9-12, and postsecondary students include recent high school graduates, reentry students, currently employed workers seeking skill update or retraining, and older students.

Given the many audiences, as well as the reality of limited budgets, most marketing committees elect to concentrate on two audiences: students and parents. This concentration does not exclude other audiences, though it highlights the priority status of the audience that students identify as (1) having a significant impact on their opinions about vocational education and their decision to enroll in such programs, and (2) as being an important source of information (or disinformation) about the different categories of high school curriculum (vocational, general, and college prep). Following the decision to concentrate on students and parents, the marketing committee authorizes a survey of these audiences to determine their perceptions of vocational education programs (i.e., interest surveys or need assessments). The primary purpose of this survey is to identify obstacles to student enrollment, and to design marketing activities to overcome these impediments. The overall content of the survey is related to the respondents' knowledge about the purpose of vocational education and vocational education curriculum. In most cases, the student responses are collected during particular classes, and parental responses are collected through a direct mail process.

The responses to these surveys help determine the choice and content of marketing activities. For instance, most schools report that parents and students (particularly those enrolled in general and college prep tracks) have negative images and misperceptions of vocational education programs. Hence, a primary objective of the marketing campaign is to address these negative images and misperceptions. For instance, the negative image is expressed in the following statements: "Vocational programs are not challenging and only provide training for specific 'craft' jobs"; "Vocational teachers are not as qualified as academic teachers"; "Students only enroll in vocational programs because they have poor grades in junior high"; and "The promise of making 'a good salary' is not realized in the jobs available to vocational students." In turn, these negative images reinforce various misperceptions of vocational education such as (1) students enroll in vocational education because they know exactly what career they want to pursue before beginning high school,

(2) vocational education programs are for students not planning to attend college, and (3) vocational education does not provide training for technical occupations.

Given these misperceptions, the purpose of marketing activities is to help inform all audiences that tech prep programs are designed to provide academic preparation and skill training for current jobs and future careers in various technical occupations. This information is disseminated through a number of activities including new or revised program brochures that contain more detailed descriptions of tech prep programs, information on the advantages of tech prep programs and training for technical careers, and a list of specific courses or program areas. For instance, the program brochures for Richmond Community College (Hamlet, North Carolina) and Portland Community College (Portland, Oregon) include the following descriptions of tech prep programs:

> The TECH PREP program provides students an opportunity to become part of a technically sophisticated workforce which can attract new industries and businesses. . . . A high school diploma is no longer the ticket to a good paying job. . . . The job market doesn't demand a great number of four-year college graduates. It does, however, demand employees who can solve technical problems and share ideas with others. (Richmond Community College)

> How does a 2+2 program change what you study in high school? The answer depends on what you plan to do after you graduate from high school—even if your plans are tentative or indefinite right now. Fact: Better entry-level jobs, and careers with a future, require more than a high school diploma. You should be preparing for further education and training while still in high school. (Portland Community College)

(See Appendix C for a complete copy of these sample brochures.)

In addition to using more detailed program brochures, an expanded marketing campaign includes the distribution of two other forms of print media: newsletters and handbooks. Newsletters are favored because they contain general information for many audiences, and handbooks because they contain specific information for select audiences. On the one hand, newsletters contain information on national, state, and local events related to tech prep programs such as (1) a description and update of new or existing articulated courses at the high school and/or community college, and (2) various announcements including summer activities, the availability of materials, the planning calendar for new programs, the impact of new legislation, and individual student and faculty achievements. Given this content, newsletters provide up-to-date and relevant information for all

audiences including students, teachers, guidance counselors, administrators, business personnel, and civic organizations. (See Appendix D for a sample newsletter.)

On the other hand, handbooks contain specific information about tech prep programs for particular audiences such as students, parents, and guidance counselors. For instance, Portland Community College and Hillsboro Union High School District (Portland, Oregon) provide two handbooks: one for students and parents and another for counselors. The handbook for students and parents includes the following information: (1) an overview of tech prep programs; (2) a list of articulated courses for which students can receive advanced credit; (3) a description of specific program areas such as dental hygiene, computer programmer, legal secretary, and building construction; (4) an explanation of the procedures for enrolling at a community college that offers tech prep programs; and (5) an account of the costs and financial support for completing tech prep programs. In addition, the handbook contains worksheets for students to plan and visualize a four-year high school tech prep program and sequence of appropriate classes, as well as worksheets to prepare a sample registration form for an associate's degree program at a particular community college. (See Appendix E for a copy of these examples.)

The handbook for counselors includes the material for students, but also provides information to help them recommend tech prep programs. For instance, the counselors' handbook includes a more detailed description of tech prep programs, a glossary of terms, additional information on the community college admissions policies, and "tips" on how to help students select a sequence of courses that match an appropriate high school and community college tech prep program (i.e., the suggestion that all programs include math, science, and communication courses). This handbook also provides a directory of services for special needs students to help counselors plan tech prep programs to meet their needs.

A second example of a well-developed counselors/teachers' manual is provided by Cerritos College (Norwalk, California). Cerritos is one member of an Articulation Consortium in southern California that includes eleven high schools, four continuation high schools, four adult schools, two regional occupational programs, and California State University at Los Angeles. The counselor/teachers' manual includes eleven chapters and seven appendices, and offers information on such topics as "the typical high school curriculum for business or high technology A.A. degree for Cerritos College" and the "procedural checklist for secondary-level teachers." The handbook also includes a detailed

program description for each articulated program area including automotive technology, business education, drafting and design, electronics, manufacturing technology, health occupations, language arts/ESL, and science and math. (See Appendix F for a copy of these examples.)

Along with the preparation of various printed materials, most marketing committees plan and implement activities that promote communication and interaction within two specific groups of audiences: (1) secondary and postsecondary faculty, staff, and administrators, and (2) parents, students, and the community at large. In general, the first category includes staff development activities for personnel who interact directly with students and who are responsible for implementing any tech prep program component. For instance, workshops or meetings are regularly scheduled for faculty, counselors, and administrators to receive information about tech prep (e.g., counselor/teacher manuals), but also to exchange ideas on effective techniques of integrating these programs into all vocational program areas.

In the second category, the activities are typically designed to inform parents, students, and potential employers (business, industry, and labor personnel) about tech prep, and to encourage their support of the programs. Furthermore, most schools establish a permanent schedule of annual or semiannual visitations, demonstrations, presentations, and promotional events. For example, many schools schedule the following types of activities: (1) secondary students visiting postsecondary campuses to observe vocational classes and demonstrations of selected technical machinery and equipment; (2) representatives from local businesses and/or parents visiting both secondary and postsecondary campuses to observe demonstrations of selected technologies; (3) secondary and postsecondary students visiting local businesses and industries to observe select technological processes and daily operations; (4) business representatives or community leaders giving presentations on the changing "world of work" or local labor markets; and (5) secondary or postsecondary student competitions in select vocational program areas (e.g., housing construction, blue print design, and innovative child care programs).

Finally, tech prep marketing committees are planning the filming of a promotional videotape during this stage. Clearly, in comparison to other activities, this can be a high budget option. However, many program personnel support using this marketing technique as a means of reaching audiences through nonprint media. For instance, one tech prep

project director stated, unofficially, that videotapes are effective tools for introducing students to tech prep programs because they can identify with student participants and "the visual experience is like watching television." Although no formal evaluation has been conducted on the effectiveness of any videotape, it continues to be a consideration for many programs. Given the ongoing interest in videotapes, some current examples are discussed in the following section.

Stage Three: Advanced Programs

At the advanced stage, several marketing campaign activities are well in place, many ongoing activities are revised or regularly updated, and other new activities are added. For instance, the content of program brochures, newsletters, handbooks, and other printed material is continually updated to include any new program information. In addition, the number of campus tours or the content of demonstrations may change as more students become interested in tech prep programs, or as new equipment is acquired.

As noted at the end of the previous section, it is at this stage that some programs incorporate the use of a videotape to market tech prep programs. Indeed, a review of two examples suggests that a well-developed videotape can be used to inform a variety of audiences. In 1990, for example, the Illinois State Board of Education coproduced a short (twelve minutes) and comprehensive videotape entitled, "Tech Prep: Planning for the 21st Century." Hosted by Jan Slingsby of the Illinois State Board of Education, Division of Adult, Vocational, and Technical Education, the overall purpose of the videotape is to describe the state initiative on tech prep. In part, this description is presented through excerpts from public speeches by leaders in business and education (e.g., a state manager of an international pharmaceutical company, the state superintendent and assistant superintendent of education, and a member of the state board of community colleges). Following these excerpts, the narrator explains how tech prep programs are based on three partnerships: (1) vocational and academic education, (2) secondary and postsecondary institutions, and (3) education and the employment community. The film concludes with a list of seven activities that the business community and employers can participate in as members of a tech prep partnership. These activities include the following:

> (1) offer priority or hiring status to graduates, (2) provide salary or advancement incentives, (3) offer scholarships or financial support for continued education, (4) provide work base training sites, (5) provide resources to schools to update programs, (6) support staff development

activities for instructors, counselors, and administrators, (7) encourage enrollments in tech prep by marketing the concept to other employers, students and parents.

In contrast to using experts or state leaders, Portland Community College (PCC), in cooperation with PAVTEC (Portland Area Vocational Technical Education Consortium), funded the production of a videotape using students as the narrators. The short videotape (twelve minutes) entitled "2+2 Tech Prep Program" was produced in 1988 and funded by the Perkins Act and Funds for the Improvement of Postsecondary Education (FIPSE) grants. Like the previous example, the overall purpose of the videotape is to present a description of tech prep programs. However, by using students as the narrators and by filming most of the content in the high school, the result is a videotape targeted at secondary student audiences. For instance, the videotape begins with students making statements such as the following: "These classes I'm taking just don't have anything to do with what I want to do"; "These people in school . . . they just want you to go to college, but I don't want to"; and "If you don't have a high enough grade point average, you just can't get into anywhere." Following these statements, one narrator suggests that, "It's easy to ask questions about your job future, but hard to find the answers. Well, maybe the 2+2 tech prep program can provide a place to start." As the film progresses, the narrator explains what tech prep programs are and how a student can get started in high school. Included in these segments are brief interviews with local employers who comment on what their companies look for in an employee. The videotape concludes with the student narrators commenting that "Maybe going to school will help me decide what I want to do" and "The 2+2 program is all right." Clearly, the dialogue and content of the film is designed to encourage identification with the narrator, and, most importantly, to "speak to" the educational needs and career interests of students (i.e., "I'm not sure exactly what I want to do, but I do want a good job, and I don't really want to go to college.").

In addition to using videotapes, some programs incorporate new marketing activities for staff development. For instance, under the direction of Partnership for Academic and Career Education (PACE), tech prep programs at Tri-County Technical College (Pendleton, South Carolina) include a summer institute for secondary counselors, teachers, and curriculum coordinators. For a limited number of participants—seventeen during the summer of 1990—tuition costs and instructional materials are paid for through a Perkins grant. The purpose of the institute is to provide secondary teachers and counselors with information about technical careers and the preparation students need to enter the

workforce. The participants acquire this information in an intensive two-week course where they learn about tech prep programs through such activities as in-class lectures, field trips, and demonstration tours. After completing the course, participants earn three semester credits and may apply for recertification in the following categories: specific content methods or nature of teaching/learning. (See Appendix G for a copy of the 1990 Summer Institute brochure.)

Finally, some programs have instituted rather ambitious activities such as statewide inservice workshops or regional conferences. For example, during the 1990-91 academic year, the Chancellors Office of the California Community College and the California State Department of Education funded a series of fifteen demonstration workshops presented at five sites throughout the state. In most cases, the staff presented the same material on three separate workshop dates; however, some sites changed the content at each workshop. For instance, all the workshops at one site (Southeast Articulation Group, Cerritos Community College, Norwalk, California) focused on a description of their model articulation project entitled "START—Success Through ARTiculation." During each workshop, panel members described the curriculum components and the role of secondary and postsecondary instructors and counselors, and participants received a copy of the teacher/counselor manual. At a second site (Central Coast Articulation Group, Allan Hancock College, Santa Maria, California), each workshop focused on a different topic. The first workshop focused on a discussion of how to coordinate articulation programs with multiple districts, the second on articulation activities at Allan Hancock, and the third on distributing resource materials.

To date, perhaps one of the most ambitious marketing efforts is the regional conference. For example, one conference is sponsored annually by the North Carolina Rural Economic Development Center, the Department of Public Instruction, and the Department of Community Colleges. The purpose of the conference is to provide information on tech prep programs in North Carolina. For instance, in September 1990, the primary focus of the two-day conference was to provide a comprehensive understanding of tech prep programs in Richmond County, North Carolina. This was accomplished in a variety of formats including student exhibits of tech prep projects and speaker presentations on such topics as "Leadership," "Articulating a 4+2 Program," "Designing a Tech Prep Course of Study with Appropriate Staff Training," "Applied Academics," "Marketing Tech Prep," "Career Guidance," and "Monitoring for Results and

Funding." (See Appendix H for a copy of the 1990 conference agenda.) Although North Carolina is not the only state to sponsor regional conferences, the increasing number of participants—in 1990 the conference was attended by over five-hundred participants from seventeen states—indicates an ongoing need to provide information to an ever-widening audience.

The value of newsletters, handbooks, and a marketing campaign in general is determined by several outcomes. Two primary and interrelated outcomes are that all targeted audiences respond positively to the content of the campaign (i.e., they "spread the word") and that secondary students, in particular, choose to enroll in tech prep programs. In general, however, the need for a marketing campaign cannot be overstated. Given the effort required to plan and implement an advanced or comprehensive tech prep program, it is necessary to use the most effective means possible of showing the worth and success of these programs. A well-planned marketing campaign is an effective technique, particularly when it includes professionally designed materials, presentations and meetings throughout the year, and activities held at both the high school and community college. In turn, a campaign is successful when more parents attend and participate in school activities for vocational programs, more teachers (vocational and academic) and guidance counselors know about and recommend tech prep programs, and more students enroll in articulated classes and plan a sequence of tech prep related coursework in their last two years of high school.

The guaranteed outcomes of a marketing campaign are significantly dependent upon several factors (e.g., commitment and resources). The most important factor is a well-developed and defined tech prep program. For instance, information can be disseminated in professionally designed brochures, but if textbooks and equipment are not in place and courses cannot be taught, tech prep programs lose credibility. In addition, when textbooks fail to arrive and lab equipment is not ordered, teachers are forced to be innovative, students are denied the full impact of the course, and these negative outcomes can lead to negative attitudes. Finally, if parents and counselors do not perceive the advantages of tech prep programs, they cannot recommend these programs to their children or students. In short, planning oversights can result in inadequate and poorly developed programs that no amount of marketing can overcome.

Component #2

Curriculum Development:

Establish articulation processes and the development of articulated course sequences that provide preparation for students to enter either immediate employment or postsecondary programs for advanced skill training.

At the heart of tech prep programs is the development of articulated curriculum between secondary and postsecondary institutions. As the material in this section indicates, there is widespread agreement on a definition of articulation and the processes for developing articulated curriculum, but several variations in the outcome. In short, while most schools follow the same steps for articulating tech prep curriculum, the result is not always the development of similar programs. Given these variations, the material in this section is organized as follows: First, the concept of articulation is discussed including a review of the definition, purpose, and benefits of articulation; second, a discussion is presented of the most common forms of articulation agreements; and third, based on a conceptual understanding of articulation, a discussion is presented on current tech prep programs and curriculum variations at each stage of program development.

Definition, Purpose, and Benefits of Articulation

In the rhetoric of tech prep programs, there is universal agreement among researchers and practitioners on the definition, purpose, and benefits of articulation (e.g., Carter, 1985; Ingram & Troyer, 1988; Lovelace, 1990; McClure, 1988; McCormick, 1980). For instance, McCormick (1980) defines the concept of articulation in terms of *process*, the coordination of educational systems, and *outcome* to prevent duplication of credit:

> Articulation is a process for coordinating different levels and/or systems of education. The purpose of educational articulation is to enable the learner to make a smooth transition from one level/system to another without experiencing delays, duplication of effort, or loss of credit. (p. 9)

> Articulation is an arrangement of components of various levels of vocational education in a connected sequence so that individuals choosing more than one level of instruction can move on to the next level without either gap or overlap in curriculum. (p. 12)

The definition of articulation can also include certain required actions. For instance, articulation requires joint-institutional issuance of policies and procedures, standardization of vocational education curriculum, based on employer requirements, and the establishment

of a local and state advisory committee for each articulated program area (Bender, 1973; Mitchell, 1989). Articulation requires cooperation from all participants and promises to eliminate duplication of coursework for all students who participate in the program.

In addition to various definitions, there are many purposes for and benefits of articulation. The most general and interrelated purposes are to increase services to students, improve educational programs, increase student retention, and reduce program costs. Furthermore, the purpose of articulating curriculum is to encourage student career development through improved programming, increase the time available for vocational training programs, facilitate the transition of students from one educational level to another, and increase the number and quality of graduates available for business and industry.

Ideally, the advantages to articulation include benefits to students, educational institutions, and the community at large. For instance, the frequently cited advantages to students include better preparation for work, the elimination of duplicate coursework, the opportunity to earn college credit, and a more efficient use of time and money. Some researchers (Carter, 1985; Mitchell, 1989) also argue that an advantage for secondary students is increased self-esteem and motivation from earning college credit.

For educational institutions, one of the major advantages of articulation is increased student recruitment and enrollment. For example, the possibility of advanced placement in a community college can increase enrollment in articulated classes at the secondary level, and the opportunity to enroll in programs that allow students to develop broad-based competencies in an occupational program area can increase retention at the postsecondary level. Additional advantages to the educational institutions include the benefits for faculty. For instance, instruction is enriched through professional interaction, and trust is built with faculty in other institutions as they participate in common staff development activities. Program improvement opportunities emerge as staff members build friendships with colleagues in other settings. Instructors develop pride in their programs and are motivated by seeing students progress along a chosen occupational career path.

Finally, some researchers argue that articulated programs are an effective means of confronting reduced funding for education and increased demands for accountability (e.g., Carter, 1985; McCormick, 1980; Mitchell, 1989). For example, providing more effective programs enhances the public image of the institution, and encourages local employers to

recognize program graduates as a source of well-trained employees. In turn, the effectiveness of an educational institution is validated when job placement rates increase as business and industry managers receive new employees with a stronger set of skills built over a period of years.

Forms of Articulation Agreements

Secondary and postsecondary institutions provide the benefits of curriculum articulation by establishing written agreements. These agreements are written for various forms of articulation such as faculty exchange, equivalency exams, tuition exchange, and dual enrollment. In addition, agreements can be written to serve local populations (between one community college and one high school district) or to serve regional populations (between several high school districts, several community colleges, and, in some cases, four-year colleges).

Although there are many forms of articulation, current observations and published results from national surveys (Long et al., 1986; McCormick, 1980; McKinney et al., 1988) indicate that over sixty percent of all schools use written agreements for two forms of articulation: (1) advanced placement or (2) advanced skill competence. The objective of these agreements is to establish curriculum that offers the benefits of either (1) shortening the time for secondary students to complete postsecondary coursework, or (2) providing the student with exit level competencies needed to enter the workforce or postsecondary institutions. Furthermore, articulation agreements are written for each course in a selected vocational or technical program area (e.g., business, health occupations, trades and industry, and drafting and design), and schools can offer these courses individually or as a sequence. For instance, in the program area of drafting and design, secondary and postsecondary schools can offer such courses as computer-aided design, technical drawing, and architectural drafting either separately or as a sequence. These alternatives and other examples are described in greater detail below.

Even though the process for receiving postsecondary credit for articulated courses varies from school to school, most institutions follow a similar process as exemplified by Chemeketa Community College (Salem, Oregon). To receive credit for advanced placement courses, the staff at Chemeketa use a testing model. In order to receive transcripted credits, junior and senior high school students must earn either an "A" or "B"

on a test administered by the community college and then enroll in at least a three-credit course within one year of graduation. For advanced skill competence courses, the student receives credit after he or she has completed a competency profile. The profile includes a list of tasks identified for entry-level occupations, and as the student completes each task the instructor checks them off and sends the completed profile to the community college. The college checks the profile and sends out a letter of recognition and transcripts the credits. There is no need for an exam because the completed competency list is a signal that the student received an "A" or "B" in the class. In most cases, a student completes all the competencies after he or she takes three classes in a program area (e.g., drafting: computer drawing, architectural drafting, and computer drafting).

General Structure of Tech Prep Programs and Variations in Tech Prep Curriculum

Given a conceptual understanding of articulation, an examination of current tech prep programs reveals that program development is guided by the following definition of articulation: the coordination of educational systems and the development of curriculum that prevents duplication of coursework and offers secondary students advanced placement or advanced skill competence.

Whether schools offer individual courses or a sequence of courses, all schools refer to articulated curriculum between secondary and postsecondary institutions as 2+2 programs, or some variation such as 4+2 or 2+2+2. Furthermore, all schools refer to these programs as "tech prep" *primarily* because the curriculum is associated with vocational or technical program areas (e.g., business, health occupations, and engineering) and includes courses intended to provide preparation for technical careers. The 2+2 version refers to a program where students enroll in individual classes, or a sequence of courses, during the last two years of high school, and complete their training after two years of postsecondary coursework. An expanded version of this model is the 4+2 program where students enroll in courses beginning in the ninth grade, and complete their training after two years of postsecondary coursework. Still another variation is the 2+2+2 program where students enroll in classes during the last two years of high school, continue their training with two years of community college coursework, and finish a program of study in the last two years of a four-year college.

All schools acknowledge the importance of including appropriate academic courses—math, science, and English—in tech prep programs. However, the actual selection of individual courses varies from school to school, as well as the use of a core sequence of academic courses. For instance, some schools strongly recommend that students in tech prep programs enroll in a selection of routinely offered academic courses such as algebra, English, and physics. In others, students in tech prep programs are encouraged, or required, to enroll in a sequence of "applied" academic courses such as Applied Math, Applied Communications, and Principles of Technology.

Finally, in many cases, when schools structure tech prep programs as a sequence of articulated vocational *and* academic classes, the intention is to offer students a program that includes "multiple exits" on a "career ladder." For instance, in the area of health occupations, students in 2+2 tech prep programs for nursing can enter the workforce after high school (nurses' aide), after one year of a community college program (licensed vocational nurse), or after two years of a community college program (registered nurse).

To understand how tech prep programs vary on the basis of these structural features, it is important to examine the process of program development and the corresponding approaches for selecting curriculum to articulate. These approaches include (1) the articulation of currently *existing individual* courses; (2) the articulation of *modified* courses and *course sequences* in part of a vocational-technical program area; and (3) the articulation of completely *new* courses, *course sequences in an entire program area*, and the development of academic and vocational-technical *core curriculum* for programs that provide training along a *career ladder*. In theory, these approaches can be used either separately or together. However, in practice, the approach to articulating curriculum for tech prep programs tends to correspond with the beginning, intermediate, and advanced stages of program development. This corresponding relationship is illustrated in Table 5, and described in the material below.

Stage One: Beginning Programs—Articulating Currently Existing Courses

Given the potential difficulties in planning and implementing tech prep programs, most schools begin by choosing the path of least resistance and articulating similar courses currently available. The courses are typically selected on the basis of high enrollment figures because the agreements will serve the needs of more students. The actual classes

Table 5

Stages of Tech Prep Program Development and Corresponding Approaches to Curriculum Articulation

Program Development Stages	Corresponding Approaches to Curriculum Articulation		
	Existing	**Modified**	**New**
Beginning	Articulation of currently *existing individual courses*		
Intermediate		Articulation of *modified courses and course sequences* in voc-tech program areas	
Advanced			Articulation of completely *new courses* and *course sequences* in voc-tech program area, and the development of academic and voc-tech *core curriculum* for programs that provide training along a *career ladder*

differ from school to school, but most secondary and postsecondary schools articulate courses in business, office systems, drafting, machine manufacturing, and automechanics. For example, under the leadership of the State Center Community College District (Fresno, California), the staff at Fresno City College participated in a 2+2 tech prep program with twenty-three high schools and two regional occupation programs. Given the number of participating institutions, the District and its partner schools began developing tech prep programs by articulating several existing courses. Furthermore, the initial thrust of the program was to "test" the process of articulation used by the District, and to articulate courses only in the vocational-technical areas. The selection of courses was based on enrollment levels and ease of curriculum coordination. The courses with consistently high student enrollment and similar content were chosen first (Drafting, Electronics, Welding, Accounting I, and Child Care). After the District staff and partner schools became comfortable with the process of articulation, the partnership expanded to a 2+2+2 program that included articulated courses with California State University at Fresno.

The same model of program development was used by the staff at Cerritos College (Norwalk, California). Cerritos is a member of the 2+2+2 Articulation Consortium in southern California. This consortium includes eleven high schools, four continuation high schools, four adult schools, two regional occupational programs (ROP), and California State University at Los Angeles. In contrast to the Fresno program, the Cerritos program initially included articulated curriculum in both academic and vocational-technical areas such as courses in business education (Accounting, Computer Information Systems, Office Technologies, and Secretarial Science) and math and science (Algebra I, II, Trigonometry, Chemistry, Physics).

A complete list of the articulated courses and descriptions of the six corresponding 2+2+2 programs (Automotive Technology, Business Education, Drafting and Design, Electronics, Manufacturing Technology, and Health Occupations) are included in a manual for counselors and teachers. For instance, the drafting and design program offers secondary students the opportunity to earn credit by completing an articulation exam in five courses (Architectural Drawing, Fundamentals of Drafting, Mechanical Drawing, Machine Drawing and Design, and Tool Engineering Fundamentals). The exams require students to show competence (one hundred percent accuracy) in eighty percent of the tasks listed in the Cerritos course description. For example, the Cerritos College list of course competencies for mechanical drawing includes the following:

The student coming to Cerritos College from the secondary-level articulated drafting program who elects to petition Cerritos College for credit by articulation/examination for Drafting 32 must be able to perform 80% of the following with 100% accuracy:

1. demonstrate vertical and inclined lettering
2. perform geometric construction
3. make pictorial drawings both isometric and nonisometric
4. make auxiliary views
5. make all sectional views
6. draw threads and fasteners
7. properly apply dimensions

(See Appendix I for a complete description of the drafting and design program.)

Clearly, at the beginning stages, the primary objective of these tech prep programs is to articulate curriculum that prevents duplication of coursework, and shortens the time for secondary students to complete a postsecondary program. Despite the emphasis on providing advanced placement, the programs at Fresno and Cerritos provide a foundation for the future development of required course sequences designed to offer advanced skill competence.

The advantage of articulating currently existing classes is obvious—it is easier for high school and community college instructors to meet and coordinate their curriculum when the course objectives, content, and evaluation instruments are already available. In general, the result of these efforts is the promotion of faculty collaboration and the opportunity to offer courses that serve the educational interests of secondary students, preventing the duplication of coursework at the postsecondary level. In a school setting where leadership may be fragmented, resources are limited, release time is a major obstacle, and instructors are not encouraged to collaborate, these are major achievements, and often necessary before undertaking more risky ventures such as articulating new courses or developing a sequence of courses.

The potential limitation of articulating currently available courses is that the hard work may need to be repeated. Given the difficulty in bringing high school and community college instructors together and designing articulated courses, it behooves personnel promoting articulation to encourage long-term planning as well as short-term gains. For instance, some schools articulate traditional vocational courses such as welding or construction regardless of whether there is viable employment. Unfortunately, however,

when enrollment drops off and the articulation agreement is withdrawn, school administrators and instructors are confronted with some difficult decisions such as whether to discontinue programs and lose teachers. These unfortunate circumstances can possibly be prevented by providing students with the opportunity to earn college credit on the basis of more broadly based course offerings that incorporate the requirements of future occupations.

Stage Two: Intermediate Programs—Modify Courses

A second approach to curriculum articulation is to modify the content of existing courses and to articulate a sequence of secondary courses in one or more vocational-technical program areas. In most secondary and postsecondary institutions, course modifications consist of integrating new occupation-related information and skills. This integration can take the form of using new textbooks, new and different computerized material (e.g., word processing packages), or new equipment and machinery (e.g., computerized milling machines). These forms of course modifications are often needed because of procedural or resource differences between high schools and community colleges. For instance, some high school courses need to be modified to keep up with the unrestricted textbook changes in the community college, or to keep up with changing skills for understanding computer software or operating machinery that the college has received through public or private donations. For example, the articulation of keyboarding, word processing, and office technologies classes typically requires secondary schools to follow the lead of community colleges and replace typewriters with computers and software packages.

Beyond these course changes, the most common form of curriculum modification for tech prep programs is the adoption of competency-based approaches to coursework. In fact, in some states this is a legislative mandate (e.g., Oregon). In addition, most secondary schools use competency-based curriculum to offer students a sequence of courses in one or more vocational-technical program areas. In most cases, each course in the sequence is articulated with a postsecondary institution, and the student can earn either advanced placement or advanced skill competence credit.

For example, Chemeketa Community College (Salem, Oregon) offers 2+2 tech prep programs in eight vocational program areas. In five areas, the staff uses the testing

model to transcript credit (accounting, agriculture, early childhood education, office occupations, and forestry); and in three areas, the instructors use completion of a competency profile (manufacturing engineering technology, electronics, technology, and drafting technology). In turn, McKay High School, for example, has articulated twenty-four classes with Chemeketa Community College. These courses are in business, drafting, home economics, and metals manufacturing and include the course sequences listed in Table 6.

For example, as shown in Table 6, students can earn a total of ten credits in drafting by enrolling in the following courses: Machine Computer Drafting, Basic Architectural Drafting, and Introduction to Computer Drawing. The student earns these credits by completing all the tasks in a competency profile. (See Appendix J for a copy of the drafting technology competency profile.) Although students are not required to enroll in all three courses, it is reasonable to assume that students who complete the sequence would have the necessary skills to enter the labor market, or to continue in a drafting program at a postsecondary institution such as Chemeketa.

Widespread support for competency-based instruction reflects an agreement with the objectives of instruction: the mastery of job-related tasks is the specific criteria for instruction, and it provides a built-in mechanism for accountability.[4] In general, competency-based curriculum materials include two major components: task listings and objectives. In addition to task listings and objectives, some contain learning activities and criterion-referenced tests. Task listings are outlines of the skills that students must be able to perform for entry-level employment in a specific vocational area. These listings consist of "duties," which are the broad areas of job responsibilities that a worker must perform (e.g., service tires) and "tasks" or specific activities leading to a completed service or product (e.g., rotate tires, change tire on rims, and balance tires). Together, the tasks and

[4]The supporters of competency-based curriculum are numerous and include teachers, community college advisory boards, and state and federal legislators. The development of competency-based curriculum is rather complex and requires information on labor market projections and job competencies. As a result of these complexities, most high schools and community colleges develop competency-based curriculum by using one of several alternatives: (1) technical professionals (e.g., the DACUM [Developing a Curriculum] process); (2) national, state, and regional curriculum resource centers (e.g., National Network for Curriculum Coordination in Vocational and Technical Education); (3) national databases (e.g., Educational Resources Information Center [ERIC]); or (4) various consortia and commercial producers of instructional materials (e.g., Vocational-Technical Education Consortium of States [V-TECS]) (Wagner, 1990).

Table 6

Chemeketa Community College and McKay High School: Articulated Course Sequences in Vocational Program Areas

Business	Drafting	Home Economics	Metal Manufacturing
Keyboarding Applications Word Processing I, II Word Processing Applications Business Machines Business Communications Business Procedures Accounting, I, II, III, IV Recordkeeping	Architectural Drafting Technical Drafting Computer-Aided Drafting	Foods I Relationships Parenting Child Care I, II	Metals I, II, III, IV
TOTAL CREDITS EARNED=35	=10	=11	=5

duties fully describe the occupation and provide a master plan for a specific vocational curriculum.

The performance objectives identify the specific capabilities to be mastered and provide the framework for the instructional sequences necessary for students to learn the desired tasks. These objectives typically have subtasks or steps necessary to perform a specific task. For instance, in a curriculum guide for auto mechanics, one performance objective is to lubricate a chassis. The subtasks include identifying types of chassis lube and lube points, locating and cleaning all chassis lubricating points, lubricating chassis fittings, lubricating door and hood hinges, installing door sticker, and cleaning vehicle.

Learning activities in competency-based curriculum specify the steps for mastering a specific task. These activities can be used by an instructor to prepare lesson plans or they can be written for a self-paced student learning guide. Finally, some competency-based curriculum includes a criterion-referenced testing component. These tests provide a means of measuring a student's performance or knowledge in relation to a specific set of behaviors or skills. In this way, criterion-referenced tests measure what students know or can do and mastery is based on meeting the specific criteria. Ideally, the student experiences little test anxiety because he or she has access to the performance tests from the outset of a task. By providing this access, the student has a concrete reminder of what is necessary to attain proficiency in an area. When students feel they have mastered the requisite skills, they can choose to take a performance test, if that is required. Furthermore, using this curriculum, the student learns vocational-technical competencies for entry-level and advanced-level positions, and, in some cases, academic competencies (e.g., the State of Massachusetts provides curriculum guides for math and/or science competencies in eighteen vocational areas).

The advantages of modifying curriculum are numerous. For instance, schools benefit from teachers collaborating and changing the secondary classes to better prepare students for postsecondary coursework. In turn, students benefit from improved curriculum because it provides tangible information and applicable training for careers in current occupational areas. Students can see the relationship between schooling and preparation for work. In addition, competency-based curriculum offers coursework that can provide an identifiable career path for students, teachers, and parents. In addition, by focusing on the skills necessary in a particular field, competency-based education creates a

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system of instruction and evaluation that is directed toward measurable results. In addition, teachers benefit by having curriculum materials that they can modify or use as a package. In fact, many teachers enjoy teaching the applied academic courses because the curriculum is already developed: the lab demonstration materials, problem sets, student learning activities, group exercises, and evaluation and testing items.

The limitation of this approach to curriculum development is that schools need to provide incentives for teacher collaboration. These incentives can include the allocation of release time and additional salaries, or hiring technical consultants to help refine competency-based curriculum. In addition, an over-reliance on competency-based curriculum can result in teachers teaching to a list of competencies and job tasks. This rigid definition of what is to be learned may result in teachers adopting an instrumental style of teaching and in students losing their desire to pursue a particular occupational area (e.g., office occupations) or enroll in further coursework. In turn, for the continued success of competency-based materials, funding must be allocated to complete the necessary updating of material with respect to employment needs.

Stage Three: Advanced Programs—Articulating New Courses, Course Sequences, and Developing Vocational-Technical and Academic Core Curriculum

The third approach to developing tech prep curriculum is to articulate new courses, as well as course sequences, and to develop vocational-technical and academic core curriculum designed to provide training along a career ladder. In most cases, this approach to developing tech prep curriculum is the result of direction provided by state initiatives or legislative mandates. For instance, in 1986, the Oregon State Department of Education allocated funds for the regional development of tech prep programs based on a consortia of secondary schools; community colleges; business, industry and labor; and job training providers. Furthermore, during the initial phase of program development, the Department of Education described several "characteristics of a functional 2+2 program" including

> (1) curriculum connected by scope and sequence from the high school through post-high school levels; (2) the integration of applied academics within the vocational technical curriculum; and (3) improved employment training by cooperatively planning and evaluating vocational programs with business, industry, labor, and other job training providers. (Oregon Department of Education, 1990a, 1990b)

As a result of establishing this statewide initiative, the development of tech prep programs in Oregon included the incorporation of new courses such as applied academics; the articulation of course sequences between secondary and postsecondary levels; and the improvement of vocational programs based on cooperative planning with business, industry, labor, and job training providers. As the material and curriculum examples in this section indicate, several other states instituted similar initiatives and have developed similar tech prep programs (e.g., Delaware, Illinois, Indiana, Ohio, Rhode Island, and South Carolina).

Applied Academic Courses

In the case of tech prep, the articulation of new courses is almost synonymous with the integration of "applied academic courses" into a core curriculum for vocational-technical programs. These courses emphasize the acquisition of academic principles and concepts through classroom and laboratory activities that connect abstract knowledge to workplace applications. The most widely used applied academic courses include Principles of Technology (PT), Applied Mathematics, and Applied Communications (Applied Biology and Chemistry is currently being pilot tested, and Applied Math II is being planned).

Many schools use the applied academic curriculum developed by the Center for Research in Occupational Research (CORD).[5] As stated in CORD publications, these courses are intended to serve as alternative core curricula in math, science, and English. Furthermore, the need for alternative curricula is based on the fact that the math, science, and English courses needed for high school graduation tend to meet the needs of students interested in pursuing a baccalaureate degree. Applied academic courses are intended to meet the needs of all students, particularly those interested in pursuing occupations that do not require a baccalaureate degree.

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[5]Although these are the widely used applied academic courses, there are others. For instance, schools in Oregon offer an applied science course entitled "Food Science." The course grew out of home economics curriculum, particularly the chemistry of nutrition (properties and composition of lipids, the process of metabolism) and food preparation (fermentation and food, solutions, colloidal dispersions, and emulsions). The course satisfies science credit in some high schools and is articulated with some community colleges. Another example is a course developed by Battell Lab entitled Materials Science. The course content includes five major topics: the nature of metals, ceramics, glasses, polymeric materials, and composite materials. The course is designed to provide training for technicians in such occupational areas as metals manufacturing and plastics fabrication.

In deciding how to use the applied academic courses, school personnel usually evaluate the course content. Principles of Technology is a two-year course in applied physics that presents material on fourteen technical principles (each year contains seven principles). Throughout the fourteen units, the material emphasizes how each principle plays a unifying role in the operation of mechanical, fluid, electrical, and thermal systems in high-technology equipment. The course is heavily laboratory oriented, and the lab and textbook material use information from relevant occupational areas such as robotics, auto mechanics, lasers, computer graphics, and medical technology.

Applied Mathematics is a set of twenty-two modular learning materials; the overall course includes material that focuses on arithmetic operations, problem-solving techniques, estimation of answers, measurement skills, geometry, data handling, simple statistics, and the use of algebraic formulas to solve problems. The materials are designed to be used in either a one-year course for academic credit or as part of existing vocational courses (e.g., mathematics material for home economics or health occupations).

Applied Communications is a set of fifteen instructional modules that can be used either individually (to broaden an existing communication or English course), or as the basis for a one-year course. The material is designed to help students develop and refine career-related communication skills. The first seven lessons provide instruction and practice in general skills, and the latter eight lessons are designed to develop and refine communication skills in five major occupational areas: agriculture, business/marketing, health occupations, home economics, and technical.

The use of applied academic courses varies a great deal from school to school. Furthermore, the articulation of these courses is a new phenomenon. Generally, schools use applied academic courses as alternatives to required academic courses in math, science, and English. This scenario is illustrated in Table 7, "Using Academic and Applied Academic Courses To Meet High School Math, Science, and English Requirements."

The purpose of using applied academic courses in this manner is to present the courses as a coherent sequence for students. In schools that adopt this approach, the applied academic courses are not modified but used as "a package." They replace physics or general science classes for students who declare a vocational major or enroll in traditional vocational courses. When these courses are taught by certified academic

Table 7

Using Academic and Applied Academic Courses To Meet High School Math, Science, and English Requirements

Courses	9th Grade	10th Grade	11th Grade	12th Grade
Math	Applied Math I	Applied Math II	Algebra	Geometry
Science	Applied Biology/ Chemistry	Principles of Technology, units 1-7	Principles of Technology, units 8-14	
English	English I	English II	English III	Applied Communications

Source: Hull and Parnell (1991), p. 80

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teachers, some schools award academic credit for required math, science, or English coursework.

In other secondary schools, the Applied Math and Communications courses are also used as "a package," but they are intended as remedial courses and targeted for vocational or general track students. One reason for this practice is that some school personnel consider these courses (especially Applied Math) as a legitimate way of providing prerequisites for regular academic courses. Most teachers and curriculum specialists generally agree, however, that Principles of Technology is too rigorous a course for remedial purposes. An alternative to using the applied academic courses as a package is to use individual modules to teach certain skills that students may need. For instance, academic teachers may use modules in Applied Communications to complement their English courses, and vocational teachers may use Applied Math as a supplement for their business classes.

To date, few secondary and postsecondary schools articulate applied academic courses because students cannot earn academic credit. The exception is Principles of Technology. Many secondary schools offer one-half or a full credit for this course and it is articulated with local or regional community colleges (e.g., Oregon high schools and community colleges and Pendleton High School and Tri-County Community College [Pendleton, South Carolina]). It is expected that more articulation agreements will be written as more schools adopt these courses and more teachers become familiar with the content.

Examples of Tech Prep Course Sequences and Core Curriculum

Perhaps the greatest advantage of using applied academic courses is that they can serve as a coherent sequence of core courses linked to a sequence of recommended or required vocational courses. This linkage is a major objective of tech prep programs and provides the student with a clear educational plan to meet his or her occupational goals. Several examples of these linkages are provided below.

At the secondary level, Pendleton High School (Pendleton, South Carolina) (1991) provides an example of tech prep curriculum that links a core of "tech prep track" courses to a sequence of vocational courses. This example is presented in Table 8. As shown in

this table, students interested in tech prep programs are required to enroll in a sequence of academic or "tech prep track" core courses. These courses include four years of Tech Prep English and three years of Tech Prep Math. Two years of science are required—physical science and biology—and additional science courses (Principles of Technology) are recommended during the junior and senior years for students interested in agricultural, automechanics, and building construction programs.

The vocational course sequences are offered in five program areas including agriculture, automechanics, building construction, business education, and commercial garment construction. The actual number of courses varies per program area. For instance, students interested in agriculture or business education can enroll in one or two courses during grades nine through twelve. However, students interested in , building construction, and commercial garment construction can enroll in only one course during grades eleven and twelve. The *Pendleton High School Curriculum Guide* (1991) does not indicate which courses are articulated, but it does include the following statement: "In some situations students completing occupational programs may apply for advanced standing in similar programs at Tri-County Technical College" (p. 14).

A second example of tech prep curriculum that includes applied academic courses is the 2+2 articulated sequence of classes offered at the Community College of Rhode Island (CCRI) (Warwick, Rhode Island) (1990). As presented in Table 9, CCRI offers seven tech prep programs for advanced-technology careers including Engineering, Electronics, Chemical Technology, Machine Design, Machine Process, Instrumentation, and Computer Science. The example presented in this table is for students interested in engineering technology. (CCRI also offers tech prep programs in Business Administration and Office Administration.) To enroll in any of the CCRI advanced-technology programs, a high school student must first complete a required core sequence of science, English, and math courses. These core courses include Principles of Technology, Applied Communications, and Applied Math. Or, depending on the program area, the student must complete the following math courses: Algebra I (Computer Science), Algebra II (Engineering), or Algebra I and Geometry I (Electronic Engineering). Students who successfully complete these secondary courses are guaranteed acceptance into the CCRI technical programs if they meet the following criteria:

> (1) a grade of C or better in Principles of Technology I and II, (2) a grade of C or better in English grades 11 and 12, (3) a grade of C or better in the

Table 8

Tech Prep Curriculum

Pendleton High School

(Pendleton, South Carolina)

Academic Courses

Grade	Required Minimum	Highly Recommended
9th	Tech Prep English I Tech Prep Math I Physical Science World Geography Physical Education Elective	Pre-Algebra
10th	Tech Prep English II Tech Prep Math II or Pre-Algebra Biology Elective	Algebra I Vocational electives
11th	Tech Prep English III Tech Prep Math III or Algebra I U.S. History Elective	Geometry Vocational electives Principles of Technology (recommended for agricultural program, automechanics, and building construction)
12th	Tech Prep English IV Algebra I Government and Economics Elective	Algebra II Principles of Technology Chemistry I Biology II Vocational elective

Vocational Course Sequences for Occupational Programs

Grade	Agriculture	Auto Mechanics	Building Construction	Business Education	Commercial Garment Construction
9th	Agricultural Science			Keyboarding and Keyboarding Applications	
10th	Agricultural Science or Agricultural Production			Business Computer Applications and Business Communications	
11th	Agricultural Mechanics I	Auto Mechanics I	Building Construction I	Office Supervision and Management or Intensified Business Occupations	Commercial Garment Construction I
12th	Agricultural Mechanics II	Auto Mechanics II	Building Construction II	One additional unit of business elective	Commercial Garment Construction II

Source: Pendleton High School (1991).

Table 9
Community College of Rhode Island
2 + 2 Secondary/Postsecondary
Tech-Prep Curriculum

GRADE 11

- Principles of Technology I
- English/Applied Communications
- Math (Applied Math I, Elementary Algebra Part I, Alegbra I)

GRADE 12

- Principles of Technology II
- English/Applied Communications
- Math (Applied Math II, Elementary Algebra Part II, Algebra II)

COMMUNITY COLLEGE OF RHODE ISLAND

Electronics—Chem. Tech.—Machine Design—Machine Process—Instrumentation—Engineering—Computer Studies

General Education Requirements

- Composition I or Technical Report Writing
- Algebra for Technology or Technical Math I and II
- Trigonometry for Technology
- Technical Physics or Physics for Technology I, II
- Electives

Tech Prep Core Curriculum
Example: Engineering Technology

	FIRST YEAR	SECOND YEAR
FALL	Fundamentals of Electricity and Electronics I Introduction to Engineering and Technology Engineering Applications of Computers	Advanced Electronic Circuit Theory and Devices Electronic Measurements and Instruments Semi-Conductor Technology Digital Electronics
SPRING	Graphics for Electronics Basic Electronic Circuit Theory and Devices Fundamentals of Electricity and Electronics II Advanced Electronic Circuit Theory and Devices Electronic Measurement and Instruments Semi-Conductor Technology Digital Electronics	Technical Project Microprocessors and Microcomputers Communication Electronics Industrial Electronics

TRANSFER **EMPLOYMENT**

Source: CCRI (1990), pp. 13, 19.

math course that meets the program requirements, and (4) proficiency on the CCRI English and Math Placement Tests. (p. 7)

Students who meet these criteria receive certification of completion and are eligible to enroll in the CCRI course sequences offered for each technical program. For instance, students interested in engineering are required to enroll in a two-year sequence of general education courses and a two-year sequence of technical program courses. The general education courses include writing, math, and science, and the technical courses include a total of nineteen classes ranging from Fundamentals of Electricity and Graphics for Electronics to Advanced Electronic Circuits and Industrial Electronics. (See Table 9 for a complete list of technical courses.)

A final example of an articulated sequence of classes is the tech prep programs at Portland Community College and Hillsboro Union High School (Portland, Oregon). As shown in Table 10, this example is for students interested in business administration occupations, specifically, accounting jobs (e.g., accounting assistants, bookkeepers, and statistical clerks). The sequence of coursework includes academic courses required for graduation and recommended vocational (business) and academic courses to be taken during the junior and senior years (e.g., Accounting I, Computer Applications for Business, and Algebra I). The student can earn community college credit in eight of the twelve recommended courses. Furthermore, if the student continues in the associate degree accounting program, he or she can earn transfer credit to a four-year college in eighteen of the twenty-seven courses required for graduation.

Training Along a Career Ladder

In all three of these examples, the tech prep curriculum is presented as a coherent sequence of academic courses linked with a sequence of vocational-technical courses. This sequencing provides students with a clear educational plan, and, in many technical program areas, it provides the student with "multiple exits" from the tech prep program. For example, the accounting course sequence at Hillsboro Union High School is designed to provide the student with entry-level skills needed for immediate employment, or the skills needed for continuing in an accounting program at a postsecondary institution such as Portland Community College. The advanced-technology programs at CCRI provide the student with mid-level skills needed for employment, or for continuing in a similar program at a four-year college. In general, as these two examples indicate, to secure employment in

advanced technology occupations, a student must complete the necessary postsecondary training; however, post-high school entry-level employment is possible in other vocational-technical program areas such as business/accounting. (For a more detailed discussion of "career ladder" tech prep programs, see Hull & Parnell, 1991, p. 52; and Lovelace, 1990).

Developing New Courses and Curriculum with Business and Industry

In most cases, the development of tech prep curriculum at the advanced stage of program development is the result of collaborative efforts with business and industry representatives. This direct input typically includes suggestions for revising existing curriculum associated with the routine upgrading of local jobs (e.g., integrating widely used computer packages into the curriculum of business, administrative, and drafting courses). In some cases, however, the input from business and industry is required for the development of new courses to provide training for new or changing employment needs in the community. For instance, as the result of significant changes in local employment trends, the Eastern Iowa Community College District (Davenport, Iowa) developed tech prep programs in hazardous waste materials technology. The specific courses were developed with the assistance of the Hazardous Materials Training and Research Institute in Davenport, Iowa. Similarly, CCRI developed tech prep programs in advanced technology because employment in local manufacturing industries has been replaced with opportunities in "high tech" industries such as robotics, lasers, biomedical instrumentation, and telecommunications. The CCRI programs were also developed with the assistance of local business and industry representatives who serve on an advisory board for tech prep programs.

There is unanimous agreement among educators and tech prep supporters that the most effective programs offer students a sequence of vocational-technical courses linked with a sequence of academic courses. Although the courses may vary, the purpose of creating the linkage is to offer students a program designed to provide the acquisition of skills and training for employment or for postsecondary education. As the examples in this section indicate, the required core of ademic courses can include applied academic courses, "tech prep track" courses, or standard college prep courses. This core is linked to a sequence of two or more courses in a specific vocational-technical program area, and these courses are typically articulated with a postsecondary institution. Furthermore, the vocational-technical course offerings reflect current employment opportunities in the

Table 10

Hillsboro Union High School

2+2 Sequence of Classes—Tech Prep Associate Degree in Accounting

High School - 2		Community College - +2	
Junior Year	**Senior Year**	**First Year**	**Second Year**
semester 1	**semester 1**	**first term**	**fourth term**
required course	*required course*	*Intro/Business	*Management
English	English	Business Math	Fundamentals
U.S. History	Economics	Intro/Accounting	*Basic Cost Accounting
Personal Finance		Keyboarding I	*Principles of Economics
		*English Composition	Macroeconomics
			General Education
recommended	*recommended*		
Essentials Algebra	+Algebra I	**second term**	**fifth term**
+Accounting I	Accounting II	*Principles/Accounting I	*Principles/Accounting
+Intro Word	+Computer	*business law	*Special Studies:
Processing	Applications/Business	*income tax	Accounting Problems
	Physical Science	*bus mach/calc	*Principles/Economics/
		*bus comm	Microeconomics
			Elective
			General Education
semester 2	**semester 2**	**third term**	**sixth term**
required course	*required course*	*Comp. in Business	*Analyzing Finance
English	English	*Accounting	Statements
U.S. History	Social Studies	Applications	*Finance elective
Health		*Principles/	General Education
		Accounting II	
		Principles/Economics	
		Elective	
recommended	*recommended*		
Essential for Algebra	+Algebra I		
+Accounting I	Accounting II		
+Word Processing	+Computer		
Applications	Applications/Business		
	Physical Science		
+ = college credit available		* = college transfer	

Source: Hillsboro Union High School District and Portland Community College (1990), p. 10.

community and the changing labor needs of national, regional, or local business and industry enterprises.

Despite the perhaps obvious advantages of offering students such programs, there are some drawbacks to consider. The most commonly expressed concern is the reluctance of educators to emphasize the use of applied academic courses (for a detailed discussion of the advantages and disadvantages of applied academic courses, see Grubb, Davis, Lum, Plihal, & Morgaine, 1991; and Hull & Parnell, 1991). In general, the applied academic courses are limited because there is no guarantee that students can earn academic credit in these courses. In most secondary schools, academic credit is only awarded for classes taught by teachers certified in academic subjects. This situation does not imply that vocational teachers cannot and do not teach applied academic courses, but there is required retraining for vocational teachers who wish to teach Principles of Technology. If students cannot earn academic credit for these classes, they may not enroll in them, and schools may decide to use the courses as electives, remedial classes, or classes specifically for special needs students. In fact, some postsecondary faculty report that employers do not find courses such as Principles of Technology adequate preparation for employment in advanced technology occupations such as engineering technician. This type of reservation also confirms the need to include business and industry representatives in the process of curriculum and program development. In short, input from these representatives not only provides the assurance that vocational-technical courses offer appropriate training for existing job opportunities, but also the assurance that new courses will be developed to prepare students for employment in new and different industries and everchanging labor markets.

Component #3

Career Guidance:

Implement an extensive guidance program that helps students understand the relationship between school and work, and learn how to plan and develop a career.

The third component of tech prep programs is career guidance. The purpose of the guidance component is to present a sequence of activities designed to help students plan and develop their career options. In part, school personnel implement these programs because survey results indicate that students want more opportunity to work on career

development, parents want more information on what schools are doing to promote career development, and policymakers want more cost-effective educational programs. Hence, the guidance programs serve a supportive role for vocational education programs such as tech prep because the sequencing of career development activities helps students gain an understanding of the relationship between school and work. In turn, students recognize the relationship between enrolling in a sequence of tech prep courses and preparing for a particular technical occupation.

To meet the needs of students, parents, and policymakers, school personnel have implemented guidance programs that promote student development at both the secondary and postsecondary levels. In most cases, the implementation of these programs requires a redefinition of guidance at the secondary level. Instead of an ancillary department or a series of fragmented and event-oriented activities (e.g., a self-esteem workshop or a career day), the guidance program is restructured into an organized sequence of activities designed to help students learn how to plan and develop their career.

The actual selection of guidance activities is unique to each school. However, like the other tech prep program components, the development of guidance programs can be located on a continuum corresponding to the beginning, intermediate, and advanced stages of program development. Unfortunately, as the material in this section indicates, there are few detailed examples of developing or developed guidance programs coordinated with tech prep. The lack of concrete examples is not the result of disagreement over the importance of guidance, but, instead, the result of limited program funding. The development of a comprehensive guidance component for tech prep programs requires financial resources and staff commitments that many schools do not have. As a result of these limitations, the guidance component tends to develop at a slightly slower pace than the other components.

Despite the slower growth of guidance programs, the specific types of activities and potential student outcomes that can be included in any program are identified by Drier and Bebris (1989, p. 5) and listed in Table 11, "General Guidance Activities and Types of Student Outcomes."

Table 11
General Guidance Activities and Types of Student Outcomes

Guidance Activities	Student Outcomes
Guidance infusion in classroom	Self-esteem
Guidance curriculum/counselor instruction	Interpersonal, social, and interaction skills
Mentoring and tutoring	Career decision making
Field-based experience	Educational achievement
Planning and decision making	Attitudes toward work and learning
Recruitment	Career and educational opportunities and interests
Placement	Job placement
Testing	Work world interest, attitudes, and knowledge
Career information systems	Career planning
Program evaluation	Life roles and selected careers
Inservice training	Family roles and work change
Other, special events	Career exploration and employability

Stage One: Beginning Programs

In school districts that support a new approach to guidance programs, the first and most common form of change is to reorganize the physical space and upgrade the equipment in the facilities. In short, after a guidance center is created, a sequence of activities is planned and implemented.

Typically, guidance facilities consist of an office or suite of offices designed to provide one-to-one counseling assistance. Such an arrangement frequently includes a reception or waiting area that serves as a browsing room where students have access to displays or files of educational and occupational information. This space is often in the administrative wing of the school so that counseling staff members are near the records and administrative personnel. Unfortunately, in many cases, the result of this physical arrangement is that guidance facilities are not easily accessible to all students, teachers, parents, and community members. For instance, students may assume counseling is an extension of the school administration and may not want to browse casually in an area near the principal's office. Access is improved, however, by reorganizing this space into a guidance center.

In general, a guidance center is centrally located and provides a collection of up-to-date print and nonprint career information. This information is disseminated through various activities for improving grade-level career awareness and increased opportunities for career exploration. For instance, the guidance staff at Richmond High School (Hamlet, North Carolina) offers classes in how to use the computerized Guidance Information System (GIS).[6] The GIS is updated regularly by Houghton Mifflin and provides national, state, and local information on such topics as financial aid for postsecondary institutions and entrance requirements for trade schools. The GIS also includes the Career Decision-Making System (CDM), an interest inventory that helps students compare their vocational interests, measured by a 120-item inventory, with five related concerns in a career choice including stated occupational preferences, school subject preferences, future educational plans, job values, and self-reported abilities and talents. Given the amount of information

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[6]For an excellent discussion on career development instruments, see Fitzsimmons (1990). Five instruments are described for the elementary school years "when children's natural curiosity and openness can be channelled into understanding themselves and others as well as learning about the meaning of work" (p. 2). Six resources are described for junior high school students to identify general values in relation to work, and nine resources are described concerning the world of work and career education for senior high school students.

provided by the GIS, the guidance courses at Richmond High School are offered throughout the school year and all students are encouraged to learn how to use the computerized resources for exploring and improving their own career awareness. The Richmond Guidance Center also provides information on postsecondary institutions, military opportunities, and local part-time employment. (See Appendix K for a complete description of the services offered at Richmond County Schools' Career Centers.)

In addition to providing various sources of career information, the guidance staff at Richmond administers aptitude and interest tests. For instance, the Differential Aptitude Test (DAT), including the Career Planning Questionnaire (CPQ), is administered to all ninth grade students. The DAT scores and CPQ responses are used to determine a student's present interests and goals. In turn, these test results are used to guide a student in his or her selection of high school courses.

Stage 2: Intermediate Programs

At the intermediate stage of developing a career guidance program, most secondary schools expand their sequence of activities to include students in seventh and eighth grades. For instance, the staff at Richmond High School expanded its guidance activities to include the requirement that all eighth grade students complete a "Career Plan Form." This form is included in the student's Career Planning Folder and indicates what course of study and corresponding classes the student has selected. In particular, the student must choose one of the three courses of study: college prep, general education, or tech prep (specifically, engineering, business, or health occupations). After the student has selected a course of study, the appropriate English, math, and science courses are listed for grades nine through twelve, along with any other courses required for graduation. The guidance counselors then use these forms to check a student's declared major against the actual course registration; if there is a discrepancy, the counselor can assist the student to resolve the difference. The result of using this system is that students are discouraged from taking a passive approach to their declared course of study, and guidance counselors are actively involved in the registration process for all students. (See Appendix L for a copy of the Career Planning Form.)

In addition to using the Career Planning Form, the staff at Richmond have instituted a sequence of activities for students in grades seven through twelve. These activities are

listed in Table 12 and include such items as scheduling individual and group counseling sessions, presenting audiovisual material, administering aptitude and interest tests, using computerized career information packages, and compiling an educational and career planning folder for each student. In general, the Richmond guidance program presents similar activities at each grade level that are designed to build on the previous year's activities. For instance, seventh grade students explore career options through computerized programs and meet individually with a guidance counselor to discuss these options and establish their career planning folder. Eighth grade students continue to explore career options through computerized programs and meet individually with a guidance counselor to declare a high school course of study. Aptitude and interest tests are administered in grades nine through twelve, and individual counseling sessions focus on establishing and clarifying post-high school plans for employment or further educational training.

Stage 3: Advanced Programs

At the advanced stage of program development, the guidance component typically includes a sequence of activities across all grade levels: K-14. To date, no tech prep program has completed this process. However, there are some tech prep programs that have integrated guidance programs between secondary and postsecondary levels and between secondary and elementary grade levels. For instance, Leander Independent School District and Austin Community College (Austin, Texas) (1990) include a mentoring program for students in grades ten through fourteen. CCRI also includes a mentoring program for students in grades eleven through fourteen, and in 1990-91, Richmond County Schools introduced career exploration activities for students in grades Kindergarten through sixth grade. Specifically, the guidance staff established a career competency profile for each student and helped them explore the development of life skills needed for the world of work.

At the secondary-postsecondary level, the tech prep programs between Leander Independent School District (1990) and Austin Community College include a well-developed mentoring program as part of the guidance component. As described by Maggie Rice in Hull and Parnell (1991), the mentoring program is an option for 2+2 students in grades ten through fourteen. The mentors include students and adult volunteers from local businesses. The program activities begin in the tenth grade, when new students are

"adopted" by seniors already in the program. In the eleventh grade, the new tech prep students are matched with adult mentors. During this first year, the role of the adult mentor is to emphasize good study habits. He or she also serves as a guest lecturer in tech prep classes, tours the school, and schedules industry visits for the participating students. During their senior year, among other activities, the mentor schedules industry visits for students to "interview various technicians on the job" (Rice, 1991, p. 294). In addition, the counseling department assesses each student's skills in the spring and assists them in preparing for summer employment. In general, the process is repeated at the postsecondary level. The first year students are "adopted" by the second year tech prep students, and they participate in structured field trips to work sites connected with their field of study. Whenever possible, the adult mentors assist the students in finding and/or securing part-time employment. (For a complete discussion by Rice of all the mentoring program activities, see pp. 287-298.)

The Community College of Rhode Island (CCRI) also offers a mentoring program for secondary students enrolled in 2+2 programs. Like the Leander/Austin program, the CCRI mentoring program uses student and adult mentors; however, most activities are designed to promote the student-student relationship. For instance, while in high school, the 2+2 students visit CCRI in the Fall and Spring semesters. During the first visit, the students receive information about technical career programs and tour the labs to get a first-hand look at the programs. During the second visit, the students participate in a full day of hands-on lab activities and meet with employers from various technical industries. At any time during the school year, high school seniors can "shadow" a CCRI student enrolled in a technical program. In addition, the secondary students are invited to attend a number of workshops scheduled throughout the year that deal with study skills, time management, and financial aid (Marmaras, 1990, p. 6).

A major advantage of developing a comprehensive guidance component for tech prep programs is that by offering a sequence of activities, guidance programs take on a new purpose. In particular, instead of viewing the secondary guidance program in terms of the remedial-reactive role filled by many individual counselors, guidance can be viewed as an educational program associated with a guidance center. As an educational program, counselors have the opportunity to offer students improved services in the areas of guidance, curriculum, and individual planning. Furthermore, the guidance center is a permanent location where counselors disseminate information directly to students through

Table 12

Richmond County Schools

Career Guidance - Grades 7 - 12

Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
1. Quest—skills for adolescence program for all students (decision making, goal setting)	1. Job-O (computerized program)	1. Differential Aptitude Test (DAT) for all students administered in December or January in order for results to be considered prior to 10th grade preregistration	1. Educational and career planning folder and prevocational folder transferred to high school Career Guidance Center and updated	1. Guidance Information System (GIS) used regularly	1. Guidance Information System (GIS) used regularly
2. Classroom guidance—introduction to career planning (audiovisual)	2. Four-year academic plan (Career Planning Form) completed prior to registration	2. Group guidance sessions prior to and after administration of DAT	2. Guidance Information System (GIS) introduced	2. Post-high school planning, course selection	2. SAT, ACT, and ASVAB
3. Choices Jr. (computerized program)	3. Vocational Aptitude Assessment (TAPS) for all high risk and/or exceptional students	3. Vocational Aptitude Assessment as needed	3. Continued interpretation of DAT	3. Interpretation of PSAT, SAT, and ACT	3. Senior interviews
4. Individual guidance session with all 7th grade students	4. Update educational and career planning folder	4. Update four-year academic plan	4. Individual conference with all 10th grade students	4. Educational and career planning folders updated	4. Post-high school planning
5. Individual educational and career planning folder set up for all 7th grade students	5. Career Finder (computerized program) available upon request	5. Update educational and career planning folder and forward to high school at end of year	5. PSAT given free to all students who have completed algebra	5. Part-time work opportunities	5. Career planning folders updated
6. Career Finder (computerized program) available upon request			6. Group orientation and interpretation of PSAT		6. Part-time and full-time job opportunities
			7. Course selection for 11th grade		

group or individual discussions, or through working with teachers and providing them with resources and information. For instance, counselors may offer a series of group discussions on preparing a job application, writing a résumé, or developing decision-making strategies.

The guidance center also provides the space and material for counselors to assist students in monitoring and understanding their growth and development in regard to their own personal aptitudes, interests, abilities, goals, and values. For instance, counselors help students understand and monitor their career interests with results from aptitude or interest tests taken at different times during the school year. In addition, counselors provide responsive services to meet the direct, immediate needs of students in such areas as general information requests, crisis counseling, and teacher/parent/specialist consultation. For example, counselors can consult with parents, teachers, and community agencies regarding strategies to help students deal with personal concerns. In addition, counselors can use adjunct guidance staff such as peers, paraprofessionals, or volunteers (e.g., mentors) to provide support in tutorial programs, orientation activities, work placement, and community-school-home liaison activities.

Finally, a structured guidance program provides an opportunity for counselors to engage in support activities such as follow-up studies and program evaluation. These activities provide information for program improvement. The sources of information include student grade reports, student "career plan" worksheets, scores from interest and aptitude tests, teacher observations, post-workshop questionnaires, review of career planning exercises, and a log of information inquiries.

In terms of disadvantages, there are few if any drawbacks to the programs. However, there are typically barriers to implementation and there is a need to formulate strategies to overcome these obstacles. In most cases, the barriers relate to philosophical issues as well as practical or procedural issues. For instance, establishing a guidance center and designing a sequence of activities for each grade level requires strong leadership and guaranteed funding. School leadership personnel, including guidance counselors, teachers, principals and superintendents, need to support a concept of career development. They need to agree that career decisions are reached through a systematic problem-solving pattern and that career development is a learning process (i.e., skills and work roles are learned and are applied directly to the decision-making process). In addition, funding is

required to reorganize guidance facilities and upgrade equipment. For instance, computer equipment is required for using career information systems such as the GIS, and additional clerical support is needed for peak work times in guidance offices. In districts where guidance programs are a low priority or where counselors are needed for nonguidance activities (e.g., entering test score data or registering new students and checking their paperwork), these barriers can remain formidable.

Component #4
Program Improvement:
Establish baseline records, evaluate outcomes, modify program.

The fourth component of tech prep programs is program improvement. As with the other components, the improvement of tech prep programs is a dynamic process. Given the nature of this process, and because most programs have only been in operation for one to three years, there is a limited amount of published material describing current improvements.[7]

In most cases, the community college assumes primary responsibility for conducting a program evaluation, publishing the results, and initiating program improvements. Secondary school personnel participate in these efforts; however, their participation is often limited by the form and content of data they can provide. For instance, most secondary schools do not have the financial or personnel resources to maintain a complete academic and career development profile on all students in tech prep programs, or to collect feedback from community members after they attend school events such as parent's night or an open house. Despite these limitations, a thorough evaluation of tech prep programs includes the participation of all "stakeholders" (e.g., counselors, students, and employers), particularly the collaborating secondary and postsecondary institutions.

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[7]Most administrators believe it takes five to seven years of operation before a comprehensive evaluation can be conducted and any major program improvements instituted (e.g., discontinuing a vocational program) (e.g., Hull, 1987; Ohio State University, 1990). Furthermore, during the first year of operation, most administrators collect information for evaluation purposes through informal means (e.g., telephone calls and unscheduled meetings). In turn, there is a limited amount of published data and there is restricted access to any information contained in school records.

The overall purpose of evaluating tech prep programs is twofold. One, evaluation data is collected to meet the concerns of practitioners and other stakeholders and to provide useful information for making decisions on program enhancements. Two, data is collected to meet the concerns of management audiences and to fulfill the legislative requirements of the state accountability system.[8] In an attempt to achieve both objectives, school personnel answer the following sets of questions: (1) those related to outcomes: "Who is served?" "What is offered?" "What is accomplished?" and "What does it cost?"; and (2) those related to process and context: "To what extent was the project plan implemented?" "How and for what reasons did it have to be modified?" "What needs were addressed?" and "To what extent were objectives reflected in assessed needs?"

Outcome Indicators

To fulfill program accountability requirements, all postsecondary institutions collect data on outcome indicators such as percentage of course enrollments, program completions, and job placements. As mentioned earlier, most tech prep programs have not been in place long enough to provide completion and placement data for graduates, so the most widely reported outcomes are the number of articulated classes and the number of students enrolled in these classes. Enrollment figures are available from secondary and postsecondary schools; however, postsecondary institutions typically provide a record of the number of students enrolled in articulated classes.

Context and Process Indicators

Ideally, program improvement decisions are made after considering data from several outcome measures (e.g, job placement rates and student satisfaction with the curriculum) and determining the effectiveness of each program component (e.g., career counseling).[9] Furthermore, data is collected by conducting both formative (before and

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[8]The reauthorized federal legislation (Perkins) also mandates the development of "outcome indicators" (e.g., labor market, learning, and access indicators) designed to measure the performance of an educational system.

[9]The use of multiple measures is supported in theory, but not often in practice. For instance, Cowart (1990) reports that of the 675 postsecondary institutions responding to a survey about assessing institutional effectiveness, sixty-one percent indicated that measures of "academic progress and placement rates" are given the highest priority. In addition, eighty-three percent of the institutions reported "it is important to use measures of student learning." However, only thirty-five percent actually use these measures to assess effectiveness. These results are part of a 1988 survey conducted by the American Association of Community and Junior Colleges (AACJC), the National Council of Instructional Administrators, the National Council of Student Development, and American College Testing.

during) and summative (at the end) evaluations. For instance, a common practice in some tech prep programs is for administrators to evaluate the actual planning process before and during program implementation. The purpose of these evaluations is to establish a record of how the various stakeholders define program objectives and perceive their role in achieving these objectives. In addition, this information provides an understanding of the historical context and a means of evaluating future responses to questions such as "To what extent was the project plan implemented and objectives achieved?"

In addition to examining the planning process, program administrators can collect useful information for program improvement by conducting a communitywide survey of interests before tech prep programs are implemented. Information can also be collected by instituting an accounting system in the career development center for determining who uses the facilities, what activities they engage in, and how satisfied they are with the services provided. This information is typically not accessible to the public; however, as programs evolve and several cohorts of students graduate, the opportunity to collect data for comparative purposes may improve and more published results will become available.

Stage One: Beginning Programs

In the beginning of tech prep programs, the focus of many program improvement efforts is on understanding the process of articulation (context and process indicators) and reporting the number of articulated classes/agreements (outcome indicators). For instance, a three-year project for establishing tech prep programs at Fresno City College (FCC) began with a yearlong examination of how to develop a process for establishing articulation agreements. Following this examination, the staff at FCC, along with project personnel from the State Center Community College District, devoted the latter two years to increasing the number of signed articulation agreements for all relevant vocational-technical and academic classes. A review of the process for developing articulation agreements and a partial listing of the articulated courses are presented in a report published by the State Center Community College (1990) entitled, *2+2+2 Equals College Credit, Now!*

Although few institutions have published a similar document on how to develop articulation agreements, all postsecondary institutions have maintained a record of the number of articulated courses that they offer. For instance, Chemeketa Community College provides an example of a relatively simple list of current (1990-91) articulation

agreements. The list presents the eight vocational technical program areas (accounting, agriculture, drafting, early childhood education, electronics, manufacturing, office occupations, and forestry), and the number of signed articulation agreements between the twenty-six participating high schools and Chemeketa Community College. For instance, Chemeketa offers articulated classes in accounting at twenty-five high schools and in manufacturing at eight high schools. (See Appendix M for a complete list of the articulation agreements.)

Stage Two: Intermediate Programs

At the intermediate stage of program development, most administrators broaden the collection of discrete outcome measures and systematically collect this information in anticipation of comprehensive program evaluations and potential program improvements. As shown in Table 13, "Articulation Summaries from Two Tech Prep Programs," CCRI and Portland Community College (PCC) report a number of summary items in their annual reports. For instance, CCRI established tech prep programs in 1987 and PCC established their programs in 1986. In 1988-89, CCRI offered ten tech prep programs, articulated with ten high schools, reported that two hundred and twenty-three high school students were enrolled in articulated classes, and that after graduation sixteen high school students continued their tech prep programs at the college. During the same year, PCC offered fifteen tech prep programs (forty-five articulated courses), articulated with twenty-four high schools, reported that three hundred and fifteen high school students were enrolled in articulated courses, and that they earned 2,580 credits at the community college. (The actual number of students who graduated and applied these credits to PCC tech prep programs is not available.)

A year later, in 1989-90, CCRI continued to offer ten tech prep programs, articulated with eight additional high schools, served one hundred and ninety-one more high school students, and reported that thirty-three high school graduates continued their tech prep programs at the college. In comparison, PCC offered three more programs (twenty-one more articulated courses), reported that forty-one more high school students were enrolled in articulated courses, and that two hundred and forty-two more articulated credits were earned at the college.

What do these figures indicate? These figures are not presented in the annual reports to prove that tech prep programs are successful. Rather, the community colleges present these figures to indicate the steady progress and development of their programs. Further evidence to support this progress is presented in the descriptive summaries of other program activities. For instance, PCC includes a summary report from each program subcommittee including demonstration projects, program continuance/improvement, staff development, forecasting and advising, marketing and communications, new avenues for articulation and partnerships, strategic planning, and student tracking. Although these are brief summaries, the descriptive information on process indicators (e.g., marketing activities) provides an additional basis for determining program "success."

Stage Three: Advanced Programs

At the advanced stage of program development, most administrators have identified a specific number of outcome indicators, established a formal process of data collection, and routinely published the results (e.g., annual reports). In some cases, these efforts have led to the adoption of a computerized tracking system for upgrading articulation records and, eventually, for identifying students by their declared tech prep major. For instance, PCC uses a computerized database to track the articulated courses offered at the twenty-five participating high schools. The database includes both aggregate and disaggregate information such as the total number of courses in each high school and, per high school, the articulated courses, credits available, equivalent courses, and faculty contact. (See Appendix N for excerpts from these articulation reports.)

A second example of systematically building a database and routinely publishing the results is provided by the Richmond County tech prep program administrators. In agreement with others, Richmond County administrators have incorporated such measures as "percentage of enrollment by program of study" and "percentage of high school graduates attending postsecondary institutions" into their program evaluation efforts. However, the school board members added other indicators to measure the attainment of six educational goals adopted in 1986. The purpose of identifying these goals was to establish "a framework within which all aspects of student needs and academic achievement can be addressed" (Richmond County School Board, Appendix O). The six goals and corresponding indicators of attainment are as follows:

Table 13
Articulation Summaries:
Community College of Rhode Island (CCRI) and
Portland Community College (PCC)

	1988-89		1989-90	
Articulation Summary	CCRI Program Estimate 1987	PCC Program Estimate 1986	CCRI	PCC
# H.S. articulation with	10	24	18	25
# articulation courses	n/a	45	n/a	66
# articulation programs	10	15	10	18
# H.S. students enrolled in articulation classes (11th and 12th grades)	223	315	414	356
# H.S. students continued in CC tech prep programs	16	n/a	33	n/a
articulation credits earned	n/a	2,580	n/a	2,822

Sources: CCRI (1990) and Hillsboro Union High School District and Portland Community College (1990).

(1) improve student achievement in basic skills (reading, language, and mathematics test results),

(2) increase Scholastic Aptitude Test (SAT) scores,

(3) decrease dropout rate (percentage of dropouts in grades 7-12),

(4) increase percentage of high school graduates attending four-year, two-year, and trade and technical schools (graduate intentions results and original goal),

(5) increase technical literacy of all students (percentage of student enrollment in college prep, tech prep, and general education; and, end of course testing in algebra I, II, and biology).

(6) improve student attitudes toward school and learning (student responses to questionnaire survey on motivation).

(For a copy of the Richmond County School's Report Card, Fall 1989, see Appendix 2N.)

With these educational goals in mind, personnel at the Richmond County District Office collected data for four years, 1986-1989, and published a "Report Card" in 1990. The information presented in the "Report Card" does not provide conclusive evidence that by enrolling in tech prep programs students have, for instance, increased their SAT or Algebra I scores. However, if Richmond County can identify students specifically enrolled in tech prep programs, then the results can be used to compare their test scores, attitudes, and graduation intentions with those of other students (college prep and general education). Assuming, of course, that other influencing variables could be controlled, these comparisons would help support a correlation between enrollment in tech prep programs and attainment of the six educational goals related to student needs and academic achievement.

The information gained from program evaluations is used to ensure quality and provide direction. For instance, new program areas can be developed (hazardous materials technology), others terminated, and some modified (adding computer-assisted instructional units to a nursing curriculum). The results of program evaluations also provide a basis for making decisions on equipment acquisition and facility remodelling such as adding computers and computer-aided design (CAD) software to a drafting program. Finally, evaluations may highlight program deficiencies. For instance, poor job placement within a

specific program may not be curriculum-based, but, rather, it may occur because students are not knowledgeable about the job placement services.

Ideally, the success of tech prep programs is determined by conducting longitudinal evaluations and collecting information on multiple outcome measures. Unfortunately, most of the current efforts rely on a limited number of outcome measures such as enrollment figures and the number of articulated courses. The result of this limited data collection is that the items measure quantity, rather than quality, aim for parsimony, rather than complexity, and tend to reflect those things that can be easily measured.

Future Approaches

After considering the diversity of current tech prep models, it is possible to speculate on the structure and content of future programs. For instance, at the heart of tech prep programs are the development of articulated curriculum and the belief that the best curriculum structure is a combination of core courses in math, science, and English, linked with a sequence of technical classes for training in a specific career area (e.g., health/human services, engineering, and business). The core courses are not required, but strongly recommended and typically include applied academics that present academic principles applied to the everyday work world. In theory, the purpose of a core curriculum is to give students a foundation of academic competencies that are applicable to the requirements of employment or to the opportunities for continued learning. In addition, the material in applied academic courses is practical, emphasizes hands-on learning in laboratory environments, and retains the integrity of the discipline.

Whether future tech prep programs will continue to be based on this structure is unknown: it will take time and will be the result of analyzing more data on program evaluation, particularly student learning outcomes. To date, many administrators use the results of standardized tests and competency profiles to claim that most students enrolled in tech prep programs achieve the targeted levels of academic knowledge and technical skills. Given these results, it is likely that the current preference for combining a core of applied academic curriculum with a sequence of technical classes will continue.

Although this structure will remain intact, it is likely that curriculum modifications will occur at both the secondary and postsecondary levels. For instance, current tech prep programs emphasize the technical and practical side of work. Course material is designed to provide students with specific technical skills (e.g., word processing, data entry, and computer-aided drafting) and applied knowledge. Although developing these skills and learning this material is important, current programs do not include course material on historical, social, and political issues related to work. For instance, the curriculum does not include material on ethical issues, public policy debates, and legislative solutions to the social problems associated with each major career area. Furthermore, the scope of material tends to exclude comparative information on the meaning of work in other cultures and among diverse groups of people.

As a result of correcting these deficiencies, students will understand the broader historical context of occupations and the relationship between work and society. For example, students might gain an understanding of the consequences of technology in the workplace by examining such issues as mechanical surveillance of worker output. More importantly, students need a better understanding of the relationship between work and our economy. Perhaps if they understand why manufacturing plants are closing, and why the number of service and technical jobs have increased so rapidly, they will be able to evaluate the advantages and disadvantages of current occupations, to determine what skills are needed to pursue a chosen career, and to be aware of what skills and training are needed to retain or change their career.

Future tech prep programs might also emphasize different evaluation criteria. Currently, a limited number of quantitative measures are used to assess program effectiveness. For instance, academic progress and learning outcome indicators (e.g., the number of program completers, the results of standardized tests, and the completion of competency lists for technical skills) are used. Although these are acceptable performance measures, they do not provide information on how satisfied students are with the program. If tech prep is marketed as a "student focused" program, then measures of student learning and satisfaction should be used to assess program effectiveness. For instance, it is important to assess whether students learn foundation skills such as reading and writing and process skills such as critical thinking and integration. It is also important to assess whether students are satisfied with curriculum offerings, academic support, career development services, the faculty, and the facilities. Finally, future tech prep programs

may incorporate multiple measures of learning outcomes such as qualitative or descriptive data. For instance, a student's academic file might include samples of his or her writing on topics related to employment and the world of work (e.g., short stories, essays, and poetry). In addition, a student's projects could be used to measure his or her technical skill competencies.

Although these examples do not exhaust the possibilities of change in tech prep programs, they do provide some important considerations. Clearly, there are a variety of current models and, as these programs mature, we will gain a greater understanding of what constitutes an effective program. Our understanding is also enhanced by examining programs that are just beginning. There may be widespread agreement on the ideal components of tech prep programs (e.g., curriculum articulation, career development, strategic marketing, and program evaluation), but there is always variation in the operation of these components, and the variation provides information for designing effective programs that suit the needs of different schools and different student populations.

PLANNING AND IMPLEMENTING TECH PREP PROGRAMS: ARTICULATION PROCESSES AND ORGANIZATIONAL STRUCTURES

Effective planning and implementation of tech prep programs begins with a clear understanding of the articulation processes. The purpose of this section is to provide this understanding by presenting (1) an overview of the processes for establishing articulation agreements, (2) a discussion of the barriers to these agreements, and (3) a description of the committees that coordinate the articulation activities and form the organizational structure for all tech prep programs. The identification of these committees is based on recent site visits and a review of the tech prep program literature. The number of committees varies among the individual program sites, but the organizational structure typically includes some combination of the following committees: executive committee, administrative and coordination committee, curriculum committee, staff development committee, marketing committee, and program improvement committee.

Articulation Processes

Development of Articulation Agreements

There are numerous advantages to articulation; however, the realization of these benefits is dependent upon well-planned and coordinated activities. Descriptions of these activities vary widely, but there are a number of essential elements associated with the process of articulation. These elements are referred to by Long et al. (1986) as the "ten principles for articulation success." These principles are discussed in all of the most widely cited studies of articulation, and are consistently acknowledged by tech prep program administrators as an important part of their articulation efforts. For instance, personnel at Fresno City College and the State Center Community College District developed a master plan for articulation on the basis of applying the ten principles. The outcome of their planning activities is presented in the publication entitled, *2+2+2 Equals College Credit, Now!* The ten principles are as follows:

1. Leadership and Commitment
2. Early Faculty Involvement
3. Respect and Trust
4. Mutual Benefits to All Parties
5. Written Articulation Agreement
6. Open, Clear, and Frequent Communication
7. Modest Initial Goals
8. Accountability
9. Competency-Based Curricula
10. Common Focus on Mutual Goals Rather Than on Individual Turf

(See Appendix P for a more detailed discussion of each principle.)

In agreement with the personnel from the State Community College District, other tech prep program administrators recognize that adhering to these principles is an important part of initiating written articulation agreements, both institutional and program (e.g., McC e, 1988; Stark, 1989; White, 1989). The institutional agreement is executed in the early stages of program planning and outlines the general terms of the articulation arrangement (e.g., cost sharing, implementation schedule, and types of programs to be included). The program agreement deals with the operational details of articulation such as the transfer of credits, costs, quality control, evaluation, and recordkeeping. (See Appendix Q for samples of these agreements.) There are separate agreements for each program area. The details of these agreements are typically determined by a number of personnel including secondary and postsecondary faculty, department chairpersons, deans,

and appropriate advisory committee members. These individuals guide the development of program agreements by engaging in such activities as (1) exchanging detailed course content documentation; (2) discussing the course content; (3) resolving any questions concerning content and achievement levels; (4) exploring areas where modifications might be made; (5) arranging to visit typical classrooms and/or labs at both educational institutions; and (6) developing a method for comparing course competencies, a written form for recording these competencies, and a policy for awarding advanced credit (Bushnell, 1978; Carter, 1985; McCormick, 1980). The coordination of these activities is described further in the forthcoming discussion of organizational structure.

Once the agreements have been formalized, the articulation arrangements should be widely publicized so that all target audiences (e.g., faculty, counselors, and students) are aware of the commitment. Additionally, a manual of administrative responsibilities and procedures should be written and updated as needed. This manual provides a reference source for clarifying existing roles and serves as a guide for newcomers to the articulation process. For instance, as described previously, Cerritos College in California provides a handbook for counselors and teachers that includes information on the processes for developing articulated curriculum.[10]

Potential Barriers to the Articulation Process

The most frequently cited barriers to articulation are those related to "turf" issues (e.g., institutional status conflicts and faculty resistance to establishing articulation agreements). Institutional status conflicts are the result of secondary and postsecondary schools being accustomed to operating independently and finding it difficult to work cooperatively. In addition, faculty resistance is often the result of being locked into attitudes and behaviors that prevent change.

These barriers have a significant impact on the articulation process because ineffective working relations between faculty and administrators can result in poor communications, reluctance to formalize programs such as tech prep through written agreements, and reduced commitment to instruction of articulated classes. Furthermore,

[10]In terms of specific "action steps" to follow for developing articulated programs, many state departments of vocational education provide a written guide to the planning process. (See Appendix R for a sample handout listing these steps.)

these turf-related issues can be exacerbated at sites where articulation is mandated at the state level with no commitment from local officials (e.g., district superintendent, community president, and high school principal). Without local secondary and postsecondary administrators and faculty recognizing the mutual benefits of articulation, it is difficult to produce long-term effective results. The state can be supportive by focusing on such efforts as eliminating bureaucratic hurdles to articulation, sponsoring workshops to inform relevant audiences about articulation practices, and providing long-term continuity in financial support. A more detailed discussion of supportive state initiatives is presented in the section entitled "Support for Tech Prep Programs: State Initiatives and Federal Policy."

To help overcome faculty reluctance, proponents of articulation emphasize the importance of including faculty and counselors during the early planning stages. In addition, they support an implementation schedule that allows faculty and staff the opportunity to gradually adjust to any curriculum changes or structural changes in vocational program areas (e.g., incorporating applied academics, or establishing a core curriculum and course sequences in vocational program areas). To overcome institutional status conflicts it is important to promote a mutual understanding of secondary and postsecondary education and training programs. This understanding can be achieved by mixing administrators and faculty on advisory committees, organizing visits to partner institutions, exchanging curriculum materials regularly, developing meeting agendas mutually, alternating meeting sites, and working on easily achievable outcomes first and using these to build a base of cooperation.

Additional barriers to achieving program success are related to problems with program management, particularly meeting financial requirements. The most common financial problems are compensating faculty for release time to develop curriculum and attend meetings; and compensating postsecondary schools for credit earned by students who complete articulated secondary coursework. There are several ways to overcome these barriers. Two examples for funding faculty release time include the following: (1) the state provides fifty percent of the funds (e.g., Perkins monies) with a requirement for fifty percent matching funds from the community college to initiate articulation with the surrounding secondary schools; and (2) the school district and community college form an Articulation Council to facilitate agreements by applying for outside funding (e.g., FIPSE

[Fund for Improvement in Postsecondary Education], Sears Roebuck Foundation, Pew Foundation, Ford Foundation, and the State Academic Partnership Program).

Some examples of how to compensate postsecondary schools for credit earned by students in secondary classes include the following: (1) secondary students receive credits and advanced standing upon enrollment in classes at the participating community college; (2) secondary students take nontechnical first-year community college classes after school hours—the public school system pays half of the tuition changed by the community college, the student pays the other half; and (3) students enrolled in articulated classes are concurrently counted as full-time equivalent (FTE) at the secondary and postsecondary level. In the example cited here, the participating school districts pay the total costs for the articulation programs. The budget is developed annually as part of the community college's and is allocated among the participating school districts on a per student tuition basis. This contracted service relationship requires that operating and capital budgets from the secondary vocational program exist as a separate cost center within the overall community college budget.

Whether someone is a seasoned program coordinator or a novice administrator, a review of the articulation processes can leave one feeling overwhelmed by the complexity and number of related activities. In part, this feeling is based on a realization that, despite the many benefits to articulation, the barriers can be formidable and a great deal of time and patience are required before many agreements can even be written. Perhaps the reality of these feelings is also associated with the historical rise and fall of interest in articulation. Interest in articulation rises when enrollments decline, when policymakers mandate cooperation, and when new instructional approaches such as competency-based education make coordination easier. Articulation efforts decrease when funding is not available to support the staff involved in making the linkages and developing the necessary curricula, when enrollments increase, and when institutions deliberately seek to enhance their academic prestige. As a result of these changing interest levels, some postsecondary institutions have been inconsistent in their approach to articulation. Some have pursued articulation with four-year universities, yet have not fostered it with secondary schools. Others have allowed the passage of time to erode their efforts, especially when articulation was viewed as an experiment. Still others have considered articulation as a normal part of the educational system.

Fortunately, the current interest level in articulation is high, and this widespread support will most likely reduce the anxieties of newcomers and nurture the growth of tech prep programs. The sources of this support include national, state, and local government agencies, national vocational educational and labor associations, and private industries. Unfortunately, this support also creates pressure for schools to articulate. As a result of feeling this pressure, and as discussed in the section entitled "Components of Tech Prep Programs," many secondary and postsecondary institutions have pursued the less demanding process of developing articulated curriculum agreements that provide advanced placement. In turn, some institutions have developed tech prep programs solely on the basis of establishing these curriculum agreements. On the one hand, such efforts allow institutions to spend less time and financial resources on developing effective working partnerships across educational levels, and less time on saving students time and tuition money. On the other hand, the development of tech prep programs based solely on courses that offer advanced placement may not provide the foundation of complex skills and knowledge that graduates need to enter the labor force or a postsecondary institution.

As more education personnel extend their efforts to developing advanced skills agreements, it is likely that the results will support a new direction in the process of curriculum articulation. This direction is supported by a renewed sense of service to students and community, a demand for educational excellence, and a need to get the most out of shrinking finances at a time of declining enrollments. Most importantly, it reflects an understanding of the impact of new technologies on technical occupations, and a need to provide appropriate training to meet the accompanying changes in skill requirements. Those educators who have turned in this direction acknowledge that the benefits from planning and implementing tech prep programs that provide advanced skills and occupational training for technical careers greatly outweigh the costs of money and staff time.

Organizational Structure

Planning and implementing tech prep programs are parts of a long-term and complex process requiring the coordination of numerous activities carried out by the members of several committees. The committees represent an organizational structure for tech prep programs. As stated in the introduction, although there is no required number of

committees, there is a relationship between the components of tech prep programs, the stages of program development, and the organizational structure. The organizational structure for tech prep programs includes a selection of committee members who plan and implement the entire program including the activities associated with each component. Given the many activities and changing priorities associated with these components, the organizational structure typically includes the following core committees: (1) Executive, (2) Administration and Coordination, (3) Curriculum, (4) Staff Development, (5) Marketing, and (6) Program Improvement.

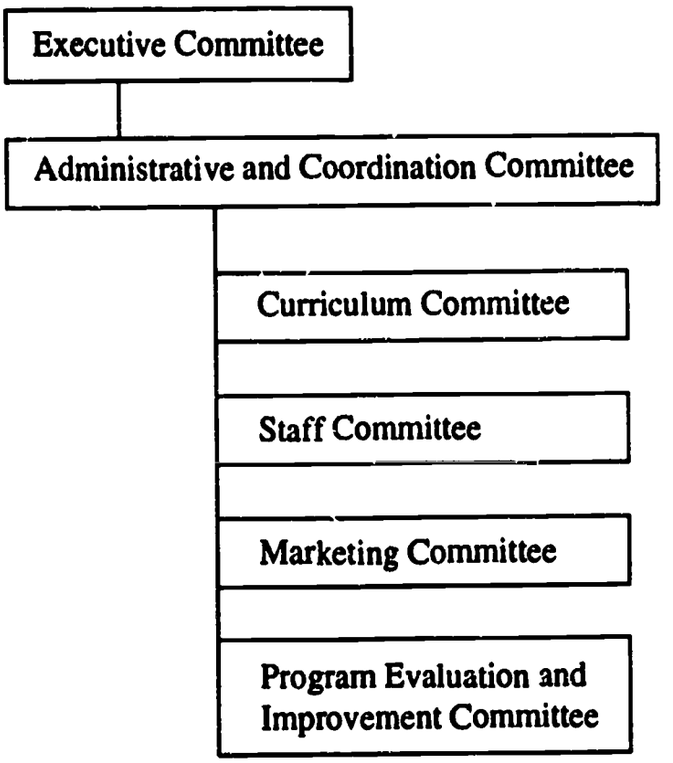
As illustrated in Figure 1, the core committees represent a flexible foundation for tech prep programs at any stage of development. As programs evolve, however, there may be a need to incorporate other subcommittees. For instance, Figures 2 and 3 illustrate alternative organizational structures for tech prep programs. In Figure 2, the structure includes the core committees and specific implementation teams for each educational institution. In Figure 3, the leadership component is multilayered and additional program components are incorporated as various subcommittees. Each figure illustrates the flexibility of the organizational structure. The purpose of this section is to describe each core committee as part of the overall foundation for any tech prep program.

Executive Committee

The primary purpose of the Executive Committee is to establish policies and procedures for implementing a plan for tech prep programs. For instance, the members determine the target date or deadlines for program outcomes (e.g., needs assessments, employer surveys, and articulation agreements), and they establish a mechanism for disbursing grant funds. Given the overall purpose of this committee, the members typically include executive personnel from the secondary and postsecondary institutions (e.g., school district and community college board members) and businesses and industries participating in the operation of tech prep programs. In short, the Executive Committee members do not do the planning; rather, they bring expertise and insights from the larger community on issues confronting their institution or corporation. The Executive Committee members ultimately decide whether the mission or purpose of the program should be changed by incorporating new or different types of students, academic programs, curriculum, facilities, or community services. Once established, the Executive Committee selects the members of the Administrative and Coordination Committee and

Figure 1

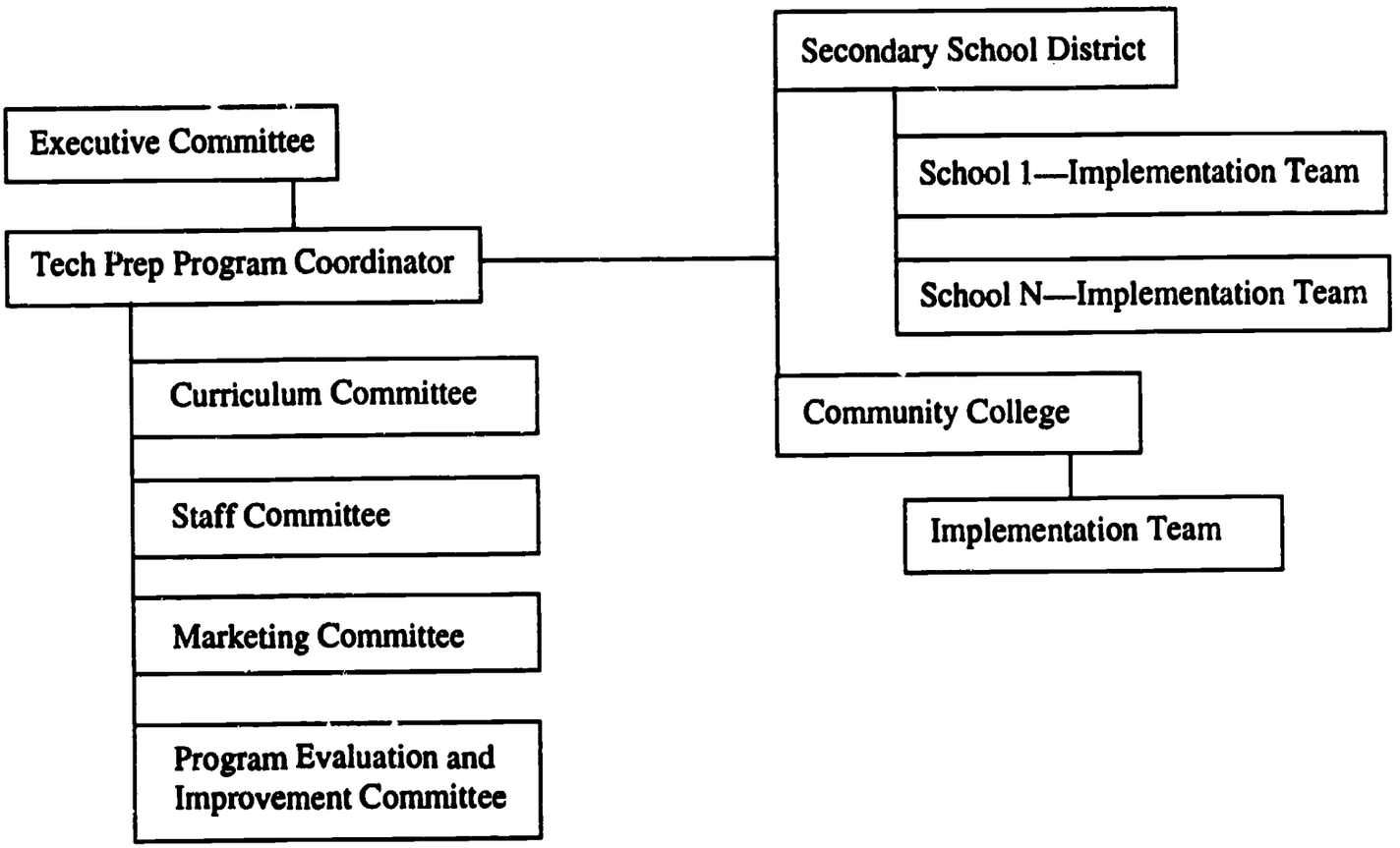
Organizational Structure for Tech Prep Programs—Core Committees



Sources: Dutton (1991); State Center Community College (1990); Tri-County Technical College (1990b).

Figure 2

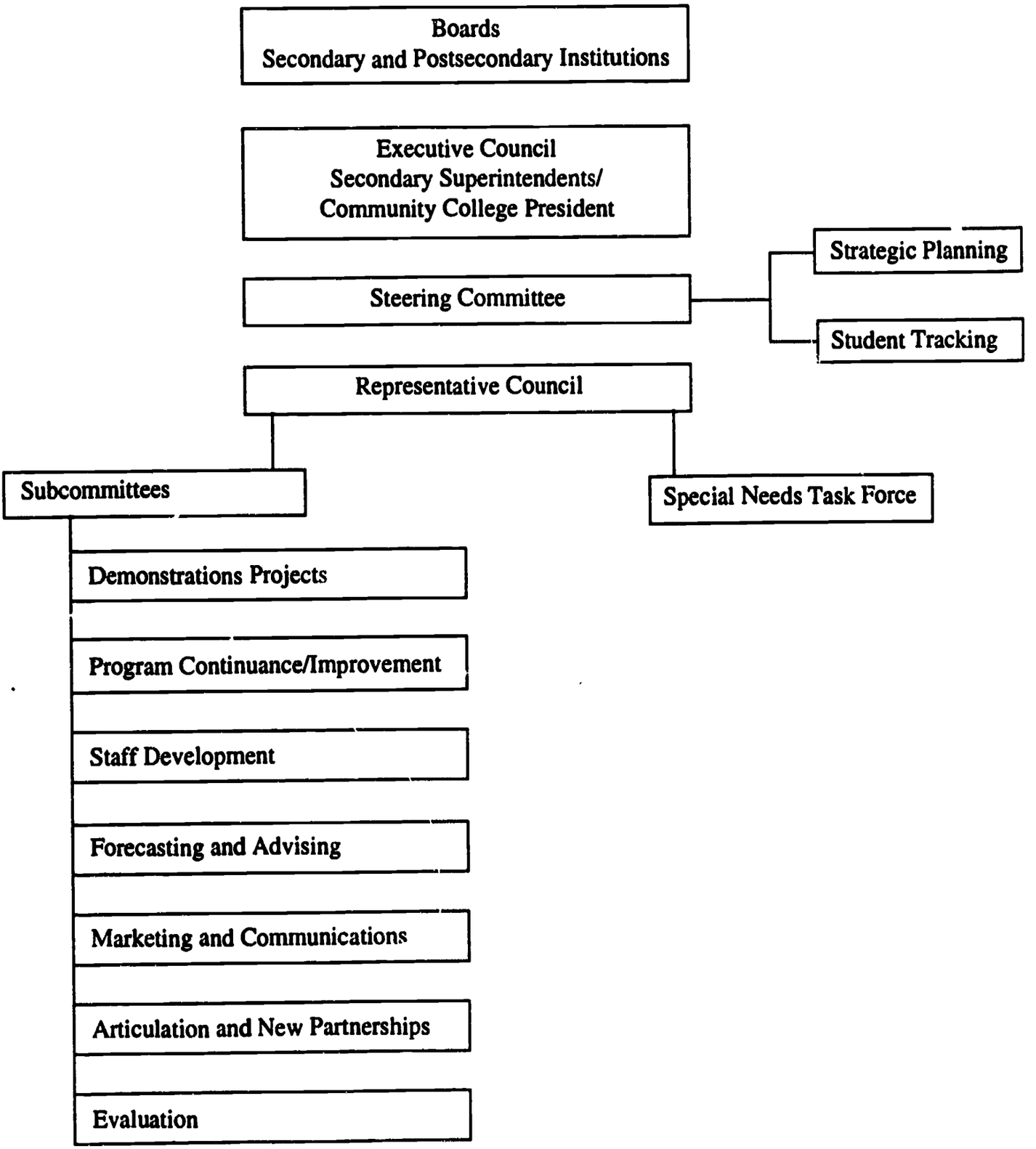
Alternative Organizational Structure for Tech Prep Programs—Core Committees, Program Coordinator, and Implementation Teams



Source: Ohio State University (1990).

Figure 3

Alternative Organizational Structure for Tech Prep Programs---Core Committees, Multilayered Leadership, Steering Committee, and Representative Council



Source: Portland Area Vocational/Technical Education Consortium (PAVTEC) (1990).

these committee members are responsible for formulating the specific plans for program development and implementation.

Administrative and Coordination Committee

The Administrative and Coordination Committee members are responsible for making the major program planning and implementation decisions. In general, the members include senior administrators from each program "stakeholder." For example, these committee members include education administrators such as deans, assistant superintendents, and principals, and business and industry administrators such as personnel managers and occupational specialists. Other members may include representatives from labor unions, civic organizations (e.g., chambers of commerce), and local agencies that administer related federal programs (e.g., Private Industry Councils).

The Administrative and Coordination Committee also selects members for the various support committees (e.g., Curriculum, Staff Development, Marketing, and Evaluation). Each chairperson from these committees also serves on the Administrative and Coordination Committee. The major advantage of this arrangement is to improve overall communications. The ongoing work by active committees can be brought together in a coordinated way, the likelihood of duplicated efforts is reduced, logical divisions of labor can be assigned, and the most timely information is brought to bear on major policy issues.[11]

During the initial phase of program planning, the purpose of the Administrative and Coordination Committee is to determine the primary goals and objectives of the plan and prepare a mission statement. (See Appendix S for a sample mission statement.) The committee members may also establish the procedures and guidelines for articulation, identify curriculum for articulation, and describe the expected course competencies and overall proficiency levels for acquired skills. For instance, one major issue confronting this committee is determining how to validate student competencies when the postsecondary institution offers advanced placement or credit for courses taken at the

[11]Two alternatives to having the Administrative and Coordination Committee members coordinate all the program activities are presented in Figures 2 and 3. The organizational structure in Figure 2 includes a specific program coordinator, and Figure 3 illustrates coordination through a steering committee and a representative council.

secondary level. At issue is whether secondary courses provide students with comparable skills and abilities to postsecondary courses. A resolution to this issue is reached by working with the Curriculum Committee; however, the members will typically consider granting advanced placement by either exam or review of instructional materials.

In addition to these tasks, the Administrative and Coordination Committee members should provide information on basic employment needs of the community, related job skill requirements, and information on how receptive (or resistant) the business and education communities are to a plan for tech prep programs. As program operations begin, these committee members may also be expected to locate additional resources and moderate any dispute at their perspective institution, organization, or agency. For instance, it is important to ensure that appropriate promotional materials (e.g., newsletters, brochures, and videos) are developed and distributed or that funding is provided for faculty retraining.

In general, however, the Administrative and Coordination Committee members are responsible for overseeing the planning process and ensuring that program goals and objectives are met. One important part of meeting these responsibilities is making sure the subcommittees are productive. In part, this productivity can be ensured by periodically asking the following questions: "Is attendance at subcommittee meetings consistent?" "If not, why not, and what can be done to improve participation?" "Is the subcommittee system working as well as it should?" "Which committees seem to be particularly productive and which are not?" "Are subcommittee meeting agendas timely?" "Are meetings interesting and do members leave with a sense of accomplishment?" and "What can be done to promote better communication between committees on issues of joint concern?"

An additional means of ensuring that program goals are met is through nurturing leadership. The Administrative and Coordination Committee members can offer this support by providing access to counsel when it is needed, or by providing constructive feedback through informal reviews of leadership performance and by assessing the strengths and needs of various personnel or program components. As a result, these efforts can provide the basis for guaranteeing constructive group discussions and for formulating ideas that represent an investment from all participants.

Curriculum Development Committee

The members of this committee typically include leading faculty and district representatives from the secondary and postsecondary educational institutions (e.g., vocational and instructional deans, department chairpersons, and curriculum specialists) and appropriate personnel from business, industry, and employment services. For instance, these personnel may include individuals that supervise entry-level workers, work in advanced-level positions, or are employed at state licensing boards.

The purpose of the Curriculum Committee is to (1) validate the occupational competencies required in the workplace for which the articulated curriculum is developed, (2) approve the developed curriculum, (3) approve the content of basic course outlines, (4) approve the criterion for determining mastery of each competency to be developed, and (5) make recommendations for the development and administration of competency exams. The Curriculum Committee members may make other contributions such as advising on the development of new or different program areas (e.g., medical office management or unibody auto construction), reviewing the technical content of course materials, supplementing current texts with occupation-related manuals or catalogs used in the workplace, and bringing special projects to the school (e.g., a competitive house building project for students in electrical, plumbing, and carpentry classes).

In cases where financial and personnel resources are limited, the Curriculum Committee may assume the responsibility of actually developing the curriculum. However, it is more likely that these tasks are delegated to subcommittees for each specific tech prep program area. For instance, a list of program areas may include business and office occupations, health occupations, service industries, automotive technology, and engineering technology. In turn, the subcommittee for, say, health occupations would develop the curriculum for the following occupations: dental assisting, dental hygiene, medical assisting, nursing, medical laboratory technology, medical record technology, radiologic technology, and opticianry. This subcommittee would, among other things, define the specific occupations and job descriptions in this area and identify the student learning outcomes for each occupation. These outcomes include the competencies required for an entry-level and an advanced-level position in the specific occupation.

Staff Development Committee

Many personnel are responsible for the actual implementation of tech prep programs, but none are more important than the vocational faculty and career counselors. Clearly, these are the people who teach the courses, help students learn specific technical skills and competencies, advise students on what classes to take, assist them in deciding what career options to pursue, and help place them in a job. Given the importance of these "players," the purpose of the Staff Development Committee is to help faculty and counselors integrate tech prep programs into their vocational program areas and their career development activities. These committee members ensure that effective inservice activities are provided for vocational faculty and career counselors and that a comprehensive guidance program is designed and/or maintained. The members of this committee include secondary and postsecondary faculty across disciplines, counselors, and career development or human resource specialists, particularly directors of affirmative action programs and directors of student resource centers.

In the early phase of developing tech prep programs, the primary responsibilities of this committee are to establish the written goals and outcomes for staff development, including a definition of comprehensive career development, and reflecting an understanding of state certification and recertification requirements for faculty and counselors. For instance, the goals should indicate support for staff development activities that help educators keep pace with the training of new personnel and enable teachers to keep abreast with new teaching methodologies. These goals should also include support for a comprehensive guidance program designed to ensure equity, and to improve student achievement in the areas of self and career awareness, decision making, career planning and exploration, and job seeking skills.

These committee members are also responsible for assuring that a needs assessment is conducted of the constituent groups (e.g., faculty, principals, and counselors). The purpose of these assessments is to understand the context and operations of current vocational programs before the new programs are integrated. For instance, it is important to assess (1) the attitudes of faculty and administrators toward their school's vocational facilities, course offerings, and instructional schedules; (2) the attitudes of faculty members toward teaching courses that include vocational content and the integration of basic skills (e.g., reading, mathematics, technical writing, science, reading, and computer

applications); and (3) the counselor's attitudes toward such activities as career planning, career assistance, student assessment, and job placement.

After the initial planning phase, the Staff Development Committee members are responsible for establishing ongoing professional activities such as tuition support programs for retraining faculty or industry partnership programs designed to update faculty competencies in vocational areas affected by changing technology. These members also recommend and approve various support materials including faculty/counselor handbooks, agendas for workshops, summer institutes, retreats, career assessment instruments, and career development resource materials, particularly those for promoting equity and cultural diversity in vocational classes. Finally, the Staff Development Committee works with the Marketing Committee to promote linkages with the community through activities such as arranging field trips to local businesses, securing speakers for guest lectures, and publishing a newsletter about the career center and related student development activities.

Marketing Committee

The most effective means of promoting tech prep programs is through a planned marketing campaign. An organized public awareness campaign is needed because the content and purpose of tech prep programs cannot be fully communicated through informal methods such as word-of-mouth. In addition, a formal campaign is the most effective means of reaching the various target audiences inside and outside the secondary and postsecondary institutions (e.g., school administrators, faculty, counselors, students, parents, business managers, personnel supervisors, and job placement specialists).

The purpose of the Marketing Committee is to plan a public relations campaign for tech prep programs. The members are responsible for developing promotional materials and disseminating these through a variety of activities including direct mailings, workshops, seminars, guest lecture series, campus and industry tours, and shopping mall displays. (See Table 4 on page 21 for a complete list of marketing activities.) The members of this committee include counselors, faculty, administrators, and students from the secondary and postsecondary institutions; public relations personnel from local businesses; and a marketing consultant. These members determine the format and content of promotional materials on the basis of their expertise, but they also rely on the results from interest surveys conducted by the Curriculum and Staff Development Committees.

One of the first, and most important tasks of the Marketing Committee is to assist in the design of a promotional logo for tech prep programs. This logo is used on all subsequent materials to help build easy recognition and, ideally, to promote a positive image of the programs. During the logo design process, a major objective of the Marketing Committee is to identify the target audiences and determine the most appropriate means of reaching these groups. For instance, parents and students are primary target audiences, but the best way to reach these audiences is not necessarily the same. Students are more likely to learn about tech prep programs at school through the campus newspaper or counseling activities, and parents are more likely to be reached at home through direct mail or radio and television announcements. In addition, the content of the message about tech prep may be similar for students and parents, but the most effective format may be different. For instance, students tend to be more receptive to video presentations and to hearing fellow students explain the advantages of tech prep programs. Members of the community—parents, industry personnel, and the general public—tend to be more receptive to professionally produced, written brochures that include a comprehensive discussion of tech prep, as well as a list of program advantages.

In the later phases of program development, the Marketing Committee members work closely with the other committees to publish a program newsletter and handbooks for students, parents, and counselors, and to schedule a program awareness conference. The newsletter is an indispensable tool for informing all target audiences about numerous topics related to tech prep programs. For instance, newsletters contain feature articles on relevant activities of the local school board or state legislature, and announcements of new courses, local conferences, faculty and student achievements, and available scholarships. The handbooks provide detailed information for specific audiences. For example, the student and parent(s) handbook contains descriptive information on the program, a list of course offerings, and a review of the application procedures for financial aid and postsecondary registration.

Program Improvement Committee

The most common form of program review is a summative evaluation conducted a year or two after operations begin. Unfortunately, relying on this process also reduces the opportunity to make immediate changes or adjustments to a particular program. In some cases, there is no need for early or ongoing corrective refinements. However, some tech

prep programs may require immediate adjustments to ensure smooth operations and achieve specific outcomes.

Given the short- and long-term need for understanding how well tech prep programs are operating, the purpose of the Program Improvement Committee is to monitor the activities and provide ongoing feedback. These committee members are responsible for collecting data and reporting the results from evaluations of program processes and outcomes. The members of this committee include representatives from the educational institutions, businesses, agencies participating in the operation of tech prep programs (e.g., district-office administrators, department chairs, and accounting personnel), and appropriate members of a private contractor specializing in program evaluation.

During the initial phase of program development, the committee members are responsible for monitoring the planning process. For instance, a concern of these members is how well-stated objectives are achieved and how planned activities are implemented (e.g., faculty collaboration in developing articulated curriculum). For these members, the most complex and time consuming activities are operationalizing program outcomes and developing appropriate instruments for data collection. For instance, the committee members need to address the following questions: "What constitutes program success?" "How can success be measured?" and "What is the most effective means of reporting the results to relevant audiences?" In all cases, a part of the answer to the question "What constitutes program success?" is the degree to which students achieve the stated course competencies and overall program goals. For example, it is important to measure how well students in business and office occupations courses learn accounting principles and computer operations, and whether taking a specific sequence of classes helps them secure employment in a related occupation.

One means of collecting the information for evaluating these outcomes is by developing a student competency profile. The format for this profile is developed jointly by members of the Curriculum and Evaluation Committees and typically contains a list of beginning and advanced competencies the student has achieved in individual courses and on-the-job training. The purpose of collecting this information is twofold. Secondary districts need a means of determining whether or not students have attained the competencies covered in instruction. Postsecondary institutions need a means of determining whether or not incoming students possess the competencies prerequisite for

further instruction. The most common form of recording and organizing this information is through a computerized data system. This system is used to monitor the educational development and progress of participating students. The Evaluation Committee members assume the responsibility for developing and implementing this system.

An evaluation of program outcomes also includes assessing how satisfied the target audiences are with the program (e.g., students, parents, teachers, counselors, and employers). Clearly, the recruitment and retention of students is based on satisfying the educational, career development, and employment needs of many audiences. Toward this end, the purpose of conducting any evaluation activity is to document the process and outcome of tech prep programs. This documentation provides valuable information for improving current programs and for structuring future programs at other locations.

The core committees in the organizational structure of tech prep programs represent a strong foundation for implementing change. Although the actual division of responsibility between the committees may differ from program to program, it is clear that no particular committee can be eliminated. The advantage of using this organizational structure is that the potential for nurturing the development of tech prep programs through to the advanced stage is greatly enhanced. Furthermore, advanced tech prep programs offer significant benefits to an educational institution and the surrounding community. In particular, these programs offer a curriculum that reflects a realistic career path for various technical occupations, and the gradation of competencies within a sequence of classes designed to lead to meaningful employment or further training in a specific technical field. Ultimately, the goal is to achieve these benefits in one location and transfer the developed tech prep programs to other locations within a particular school district, state, or geographical region. Based on the results of some exemplary programs, the likelihood of developing transferable tech prep programs is significantly improved by using a multifaceted organizational structure and systematically developing tech prep curriculum through a well-defined articulation process. The likelihood of developing transferable programs is also enhanced by supportive state and federal policies, the importance of which are discussed in the next section.

SUPPORT FOR TECH PREP PROGRAMS: STATE INITIATIVES AND FEDERAL POLICY

A thorough examination of the development of tech prep programs includes an understanding of the basic structural issues underlying the delivery of vocational education—in particular, the issues related to how states govern and administer vocational education, and how federal policies are filtered through these structures. It is important to examine these issues for two reasons. First, because funding for tech prep programs is transferred through a state system of public vocational education, it is important to understand how the system's multiple providers and oversight agencies affect the implementation process. Second, because the center of gravity in educational policy is shifting from federal to state levels, it is important to understand how federal policies on vocational education are administered through the state system of public vocational education.

In general, the state system represents a mechanism through which state and federal initiatives toward specific target groups become transferred to the operational program level. Given the importance of these issues, the purpose of this section is to examine how state initiatives and federal policy inhibit or facilitate the development of tech prep programs. The material in this section is based primarily on the results of four investigations commissioned by the National Assessment for Vocational Education (NAVE): Elmore (1987); Lawrence (1987); Millsap, Wood, Jastrzab, and Marder (1989); and National Center for Education Statistics (1988).[12] Whenever possible, information from these investigations is supplemented with examples from recent site visits.

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[12]Millsap et al. (1989) conducted a nationwide survey to determine the direct effects of the Perkins Act on state and local administration and implementation. This investigation included the only national survey of local vocational education practices, and the largest set of qualitative case studies of state and local practices. The NCES (1988) conducted a survey of state vocational education coordinators to examine such issues as methods of allocation, allocations between secondary and postsecondary institutions, and state quality control mechanisms. Finally, Elmore (1987) and Lawrence (1987) were among the invited scholars who participated in the NAVE sponsored conference on "the conditions of vocational education in the United States." Their presentations appeared, respectively, in the following conference proceedings: "Policy Issues in the Governance of Vocational Education" and "Analyzing The Implementation of Federal Vocational Education Policy: The Perkins Act of 1984."

State Initiatives

The governance structure of public vocational education varies from state to state. The agencies in this structure can represent school districts, secondary and/or postsecondary area vocational schools, technical institutes and/or community colleges, proprietary schools, and even public and private four-year institutions. Although no two states are exactly the same, there are four broad categories of governance:

> one agency for all levels of education
>
> one agency for elementary and secondary schools including vocational education, and a state coordinating or governing agency for higher education
>
> one agency for elementary and secondary schools, one agency for vocational education, and a state coordinating or governing agency for higher education
>
> one agency for elementary and secondary schools including vocational education, and governing boards for individual institutions of higher education with no statewide governing agency. (Lawrence, 1987, p. 15)

Through the governing structure, state leaders allocate funds and provide programmatic guidance to local administrators of vocational education. Furthermore, in most states, the administrative authority over federal funds (i.e., Perkins funds) and the providers of secondary vocational education are located in the state vocational education director's office.[13] The administration of postsecondary vocational education is typically shared by several offices at the state level.

The personnel in vocational education agencies have the potential to exercise leadership either on their own or in conjunction with other important state actors. As a result, initiatives in vocational education highlight the capacity of state agencies to provide leadership either by (1) working with state legislators, the governor's office, and other state agencies; (2) exerting a strong role with the varied local providers of vocational education; or (3) working with both state and local actors.

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[13]The state director's office is the site of administrative authority over federal funds because federal law requires a "sole state agency" for administration of the state planning process, state councils, the segmentation of vocational education into program areas under federal definition, and the federally defined evaluative and occupational data provisions. In a few states, the director who administers federal funds has authority over all secondary *and* postsecondary providers of vocational education (Millsap et al., 1989).

During the 1980s, the ability of state agencies to provide leadership was put to the test when states undertook a number of education-related initiatives, and, in some cases, economic development activities. State legislatures increased secondary graduation requirements, and, in some instances, these changes were accompanied by additional state funds for school improvement or other education reforms. Several vocational education agencies undertook the development of model curricula to meet the labor market needs in their state. In addition, some states paid increasing attention to economic development initiatives related to targeted education levels (e.g., upgrading skills of assembly-line occupations) (Millsap et al., 1989; National Center for Education Statistics, 1988).

Current vocational education practices and the potential success of new initiatives are clearly a reflection of state agencies that tied into these initiatives. For instance, the development of tech prep programs is partially due to the activities of state directors who recognized the need to upgrade vocational education programs and who allocated Title IIB Program Improvement Funds to develop competency-based curriculum. As reported by Millsap et al. (1989), of the nine states included in the survey commissioned by the NAVE, seven states reported using these funds to support statewide initiatives for developing competency-based curriculum. The results of their research also revealed that some states used Program Improvement Funds to sponsor the implementation of pilot or model programs such as Principles of Technology; and all nine states belonged to at least one interstate consortium on curriculum development. In response to why states invested in curriculum development, Millsap et al. reported the following:

> to upgrade vocational programs,
> to alter the content of vocational offerings, usually to integrate basic skills, and
> to highlight the value of vocational education. (p. 48)

The results from Millsap's investigation are consistent with current observations. For instance, at each postsecondary site the program administrator indicated he or she used federal Program Improvement Funds to support the development of tech prep programs. In some cases, the funds were used to purchase equipment to implement Principles of Technology (e.g., Richmond High School). In other cases, the funds were used to support release time for faculty to engage in developing competency-based courses (e.g., Portland Community College).

What were the conditions that allowed these initiatives to flourish in some states and not others? Although there is variation, state initiatives tend to be heavily influenced by the strong "local control" tradition that characterizes interactions between state education agencies and school districts. In particular, states with a history of providing program improvement information to local providers are the same ones that tend to offer support for curriculum development and the implementation of tech prep programs.[14] For example, personnel in the Oregon State Department of Education, Division of Vocational Education, played a major role in supporting legislation that mandated the development of competency-based curriculum. Furthermore, they consistently provided financial allocations and technical assistance to help local district personnel develop curriculum and participate in other planning activities such as inservice workshops to learn about articulation processes and how to implement programs accessible to all students, especially those in special populations.

As reported by Millsap et al. (1989), there are several factors that distinguish strong state administration of vocational education. The state vocational education agency is an independent organization. State policymakers usually agree on the value of vocational education; in turn, they provide increased state funding and agree to continue support. The state director is usually seen as a strong leader and a person who has established a history in that position (e.g., five years). The state staff has experience and expertise in program improvement and in providing technical assistance. In addition, more directive states are likely to set the minimum number of instructional hours and minimum course sequences in secondary vocational education, as well as to examine vocational course content (NCES, 1988).

While there are states that reflect these factors of strength (e.g., Oregon), there are some state agencies and leaders who are inflexible and resistant to change. In these cases, guidance to local districts is provided almost exclusively on compliance issues, frequent changes in leadership result in conflicting relationships between state and local leaders, and policymakers with an antivocational bias tend to emphasize only general academic skills instruction at the secondary level. Whether state leadership in vocational education is

[14]State agencies also provide information on compliance with policy regulations. In most cases, however, state vocational education systems tend to provide expertise in one area or the other: program improvement or compliance (Millsap et al., 1989).

strong and coordinated, or weak and fragmented, all state agencies are influenced by federal law.

Federal Policy

Although states maintain a basic autonomy and discretion in the administration of vocational education, federal funds can serve as discretionary resources and as legal prescriptives that target funds to areas of greatest need. The Perkins Act was designed to give states wide latitude in the content and range of programs and supplemental services (Elmore, 1987). In providing this latitude, the Perkins Act also earmarked funds for program improvement, innovation, and expansion; in turn, it provided a mechanism by which some states initiated the development of tech prep programs. This foundation has been significantly enhanced with the reauthorization of the Perkins Act which includes the Tech Prep Education Act of 1990.[15]

As stated in the Tech Prep Education Act, federal funds are available to support the development and operation of articulated 2+2 programs. In addition, grants are awarded to a consortia of local educational agencies and postsecondary educational institutes. The Act also specifies some elements of the content of tech prep programs. For instance, the programs must include a common core curriculum of mathematics, science, communications, and technologies. In addition, student competence in these curricula should be achieved through a sequential course of study and through using applied academics. Tech prep programs must be designed to lead to an associate degree or certificate in a specific career area including at least one of the following fields: engineering technology; applied science; mechanical, industrial or practical art or trade; agriculture; health; or business. Finally, the Act specifies that tech prep programs must include inservice training for teachers and counselors, provide equal access to members of special populations, and provide preparatory services to assist program participants. (See Appendix T for a copy of the Tech Prep Education Act of 1990).

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[15]The Perkins Act of 1984 is not the first federal legislation to provide support for articulated curriculum, the foundation of tech prep programs. A review of the legislative history of articulation programs (Bender, 1973; Michigan State Department of Education, 1975; Oregon State Department of Education, 1968; Woelfer, 1978) reveals that the first major attempt to establish tech prep programs was the result of abundant federal "manpower legislation" (e.g., The Manpower Development and Training Act of 1962 and the Vocational Education Act of 1963).

The purpose of the Tech Prep Education Act is to initiate action in order to muster the political support to construct a successful education coalition. It does not specify exactly what is to be done nor does it address anticipated solutions to operating problems. Instead, state and local administrators, direct providers of education and training, and clients of the system provide the missing information about what constitutes a good program. Furthermore, the Act sets the frame of reference for determining what problems are important and what outcomes are regarded as successful. For instance, one solution to the problem of providing "youths with skills in liberal and practical arts and in basic academics, and with an intense technical preparation necessary for finding a position in a changing workplace" is to establish systematic technical education articulation agreements between secondary schools and postsecondary education institutions (Appendix T, p. 39). However, administrators and service deliverers in certain key implementation roles must fill in the details of this problem at their level and bring the resources of organizations and individuals to bear on the solution.

The "success" of the Tech Prep Education Act of 1990 will in part be determined by the extent that it helps to mobilize the skills, resources, and incentives of key actors around the problems that policymakers consider important. The determinants of success lie in the attributes of the organizations and of the individuals that implement them. For instance, the support of state leaders is particularly important because the development of tech prep programs requires the coordination of secondary and postsecondary activities, but the office that oversees federal funds typically serves secondary vocational education providers (see footnote 11). As a result, issues concerning secondary vocational education have a direct link between the state and federal offices, but those of postsecondary vocational education do not. Hence, concerns about allowable postsecondary practices tend to be unaddressed or are minimized.

Fortunately, this lack of coordination between secondary and postsecondary vocational education is addressed in this Act. The Act directs federal funds explicitly to support the planning and implementation of articulated vocational education programs between secondary and postsecondary institutions. In turn, the Act provides an impetus for state administrators to develop a comprehensive strategy for human resource

development, and to use federal funds for coordinating state and local education and training programs.[16]

Responding to The Tech Prep Education Act

At the time of this writing, the federal rules and regulations for the Tech Prep Education Act are not available and the deadline has passed for the submission of state plans. Despite these administrative technicalities, it is possible to speculate on the impact of this Act.

After reviewing several tech prep programs and recognizing the various stages of program development, it is clear that the Tech Prep Education Act encourages long-term planning of educational objectives to meet training needs, and that it supports the development of comprehensive tech prep programs (i.e., programs that must lead to an associate degree, include a core curriculum, and achieve student competence through a sequence of courses). Despite the emphasis on developing comprehensive programs, the Act also supports the use of technical assistance from state or local entities that have successfully designed, established, and operated tech prep programs. As a result of explicitly authorizing the use of technical assistance from currently operating programs, and by offering three-year grants for planning and implementation, the Act represents an opportunity for states to either initiate tech prep programs or improve and strengthen existing programs. Furthermore, given the widespread success of current tech prep programs, it is highly probable that federal support will continue after the initial three-year grant is completed. In short, this Act represents a significant commitment from federal leaders to support the ongoing development of articulated vocational education programs.

For those states submitting grants for Tech Prep Education Act funds, administrators may want to consider several factors related to program success. Tech prep programs are multifaceted and are the result of coordinating activities between multiple agencies and institutions over a relatively long period of time. The number of

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[16]This is not the first opportunity state administrators have to use federal funds for coordinating education and job training programs. Both the Job Training Partnership Act (JTPA) and the Perkins Act of 1984 called for this coordination. In fact, there were numerous references in both federal laws to encourage crossover where possible at the level of program delivery. The Tech Prep Education Act, however, explicitly supports interagency cooperation because grants are only awarded to a consortia of local educational agencies and postsecondary education institutions. Furthermore, the consortia members are responsible for collaborating on the development of articulated tech prep programs.

comprehensive tech prep programs is currently very small because it takes at least six years to reach an advanced stage of development. Given the many years of program development, state administrators may want to use federal funds to establish tech prep programs in one region and "export" those programs to other regions. Or, if statewide programmatic changes are being considered, the funds may be used to support the development of competency-based core curriculum for tech prep programs. This core curriculum could then be used across all program areas.

Most importantly, administrators cannot limit themselves to using only federal funds for program improvement in vocational education. State and local funds must be allocated for these purposes, and interagency cooperation needs to be established between providers of education and training programs. Particularly at the local level, federal funding has been an important resource, but rarely used as a catalyst for change. Perhaps the availability of Tech Prep Education Act funds will be considered for launching new innovative activities. Given the current state of education reform, increasingly limited resources, and overextended personnel, these funds may make a significant contribution to positive changes in vocational education programs at both secondary and postsecondary institutions.

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Appendix A
List of Site Visits, Conferences Attended, and Other Program Documents Reviewed

SITE VISITS, CONFERENCES ATTENDED & OTHER PROGRAM DOCUMENTS REVIEWED

SITE VISITS

California	Iowa
State Community College District (Fresno)	Eastern Iowa Community College District (Davenport) Scott Community College Pleasant Valley High School
Cerritos College (Norwalk)	
Peralta Community College District (Oakland)	

Oregon	North Carolina
Lane County Educational Service District (Eugene) North Eugene High School Churchill High School	Richmond County School District (Hamlet) Richmond Community College Richmond Senior High School
Chemeketa Community College (Salem) McKay High School	
Portland Community College District/Portland Area Vocational-Technical Education Consortium Benson High School	

CONFERENCES ATTENDED

North Carolina Tech Prep Conference
Greensboro, September, 1990

Center for Occupational Research and Development, Tech Prep Workshops
Los Angeles, September, 1990
Oklahoma City, February, 1991

California Community College Administrators of Occupational Education
Santa Rosa, April, 1991

OTHER PROGRAM DOCUMENTS REVIEWED

California: Chaffey College

Delaware: Delaware Technical & Community College

Illinois: Illinois State Board of Education, "Illinois Tech Prep," description of statewide initiative

Oregon: Mt. Hood Community College

Rhode Island: Community College of Rhode Island

South Carolina: Tri-County Technical College & PACE Program

Wisconsin: Milwaukee Area Technical College

Appendix B

Copies of Sample Brochures:

Illinois State Board of Education and Mt. Hood Community College

[redacted] volved in **Tech Prep.**

General academic instructors can:
- involve students as active learners through teamwork and problem solving
- use applied and/or functional approaches to teaching
- make assignments work-related

Vocational-Technical instructors can:
- reinforce academic foundations through vocational-technical class assignments
- encourage independent investigation through problem solving
- ensure course content reflects current practice in the workplace

Administrators can:
- provide opportunities for academic and vocational-technical instructors to meet together to plan complementary activities and learn from each other
- work with instructors to plan sequences of challenging courses that are appropriate to occupational goals and will enable students to pursue postsecondary education
- eliminate low-level "general" academic courses from the curricula and replace them with more challenging, applied courses

Counselors can:
- inform parents and students about opportunities as they plan for high school and beyond
- prepare brochures and scheduling information that clearly explain the options open to students through Tech Prep
- promote sequences of courses that are challenging and appropriate to students' interests and will enable them to pursue a postsecondary experience

Together, we prepare tomorrow's qualified workforce...today.

ILLINOIS STATE BOARD OF EDUCATION
100 North First Street, Springfield, Illinois 62777-0001

Thomas Lay Burroughs, Chairman
Robert Leininger, State Superintendent
An Equal Opportunity/Affirmative Action Employer
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Tech Prep

More Than The 3 R's

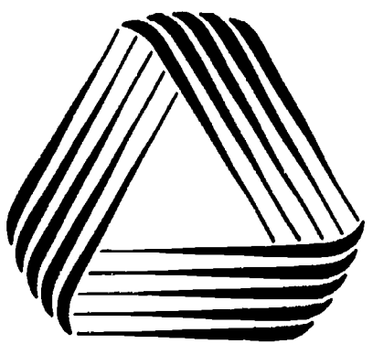
It's Just Not Enough For A High School Graduate To Know The "Three R's"

Widespread advancements in technology are making it more and more difficult to keep up with the rate of change. Now more than ever, businesses are seeking a *technically qualified workforce* to retain a competitive edge on both a national and an international basis.

The changing workplace provides opportunity but also demands new skills -- not only new technical skills, but skills in *communication, computation, problem solving and critical thinking*. Individuals must understand the culture of the workplace and be able to contribute positively to the company's success.

A bold educational reform initiative called **Tech Prep** addresses these workplace demands by integrating college preparatory coursework with a rigorous concentration of technical education. Planned sequences of courses begin at 9th grade and are followed with a postsecondary experience leading to an associate degree. Students also have the option of obtaining a four-year baccalaureate degree.

Tech Prep equips students with the skills and competencies necessary to meet employers' expectations not only for entry-level jobs, but also for career advancement. *It prepares students with the basis for a lifetime of learning.*



Tech Prep requires the partnership of *technical and academic educators, education and business, and secondary and postsecondary education*. Together we can meet this challenge of preparing our students for the future.

Tech Prep and You

As educators offering and endorsing **Tech Prep**, we can provide an opportunity for our students to attain growth, upward mobility and a continuing desire to learn. This is a unique opportunity for all education professionals to restructure curricula to meet the changing needs of tomorrow.

For more information please contact:

Illinois State Board of Education
Department of Adult, Vocational and Technical Education
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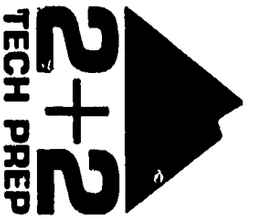

2+2
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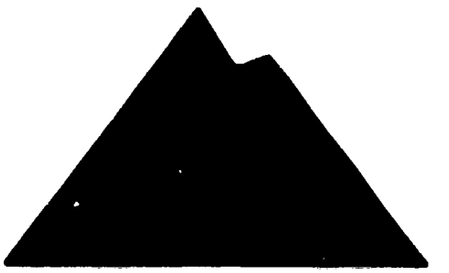

2+2
TECH PREP

THERE'S A PROGRAM

FOR YOU . . .

2+2 TECH PREP and V.I.P. CAN PROVIDE YOU WITH...

- a planned sequence of technical classes in grades 11 through 14 (two years in high school + two years at MHCC)
- the opportunity to receive MHCC credit for technical skills learned in high school
- the opportunity to shorten the time necessary to earn an MHCC Associate degree
- the opportunity to pursue more advanced technical course work at MHCC because prerequisite skills were learned in high school
- a connected high school-MHCC technical program that will prepare you for high demand technical careers

Vocational Technical Education... A Choice with a Future

For both 2+2 and V.I.P. contact:

Centennial High School ..... *Dick Lund,* 661-7612
Corbett High School ..... *Jane McClellan,* 695-2236
David Douglas High School ..... *Kathy Lillis,* 252-2900
Gresham High School ..... *Bill Maddox,* 666-8033
Sam Barlow High School ..... *Ron Walp,* 663-4112
Parkrose High School ..... *Rosalie Czapszys,* 257-5273
Reynolds High School ..... *Sarah DeKay,* 667-3186
Sandy High School ..... *Lon Welsh,* 668-8011
Mt. Hood Community College ..... *Johnnie Stokes,* 667-7323
2+2/V.I.P. Coordinator ..... *Jim Schoelkopf,* 257-1618

What is V.I.P.?

V.I.P. is the Vocational Inter-District Program sponsored by the Mt. Hood Regional Cooperative Consortium, a group of seven school districts (8 high schools) which have agreed to share some of their vocational education courses with students from neighboring districts.

Participating students spend a portion of the school day in their resident high school and another portion in the nearby district's program.

If, for example, you are interested in a program not offered in your school or within your district, you may apply for a course available in another district.

Students must apply, be accepted, and pre-register in the Spring for classes beginning in September.

V.I.P. provides a broad range of outstanding opportunities for all students, whether college bound or not, which can expand options for the future. All classes welcome both male and female students.

V.I.P. Classes

- Automotive
- Building Construction
- Child Care
- Electronics
- Food Service
- Graphics
- Horticulture
- Hospitality & Tourism
- Manufacturing Technology
- Marketing
- Office Technology
- Principles of Technology
- Video Technology
- Health Occupations

To Apply & Register for V.I.P.

1. Find out all the details about the class from your counselor, career/vocational counselor, or V.I.P. Contact.
2. Meet with your counselor, review your credits/schedule and obtain approval to apply.
3. Make arrangements to visit a class through your school V.I.P. Contact.
4. Complete an official V.I.P. applications and return it to your school V.I.P. Contact.
5. Obtain confirmation of enrollment from your school V.I.P. Contact or the V.I.P. Coordinator (257-1618/669-6935).

2+2 Tech Prep

Connected high school-MHCC programs have been developed in:

- Accounting
- Horticulture
- Automotive
- Cable & Community Television
- Early Childhood Education
- Electronics
- Engineering Technology
- Entrepreneurship/Small Business Management
- Manufacturing Technology
- Office Technology
- Welding Technology
- Hospitality and Tourism Operations
- Journalism

These programs have been developed in cooperation with area business and industry representatives so the technical training will include the skills and knowledges required by area employers.

Appendix C
Copies of Sample Brochures:
Richmond Community College and Portland Community College

1986-1987 — 1987-1988
Richmond County Schools/
Richmond Community College

1988-1990 Pee Dee Tech Prep

Anson County Schools
Montgomery County Schools
Moore County Schools
Richmond County Schools
Scotland County Schools

Anson Community College
Montgomery Community College
Sandhills Community College
Richmond Community College

Sponsored by Pee Dee Council of Governments
North Carolina Rural Economic Development Center Inc

1990-91 North Carolina Tech Prep Leadership Development Center

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Mr. Roger Worthington, Director
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North Carolina Department of Public Instruction
North Carolina Department of Community Colleges

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NORTH CAROLINA

Tech Prep

AN EDUCATIONAL FOCUS FOR THE MAJORITY

Why Tech Prep?

Competition for new businesses and industries is fierce. Just as the United States is in competition with other countries in the world marketplace, each state in this country is competing for new and expanding industries and economic growth. Likewise, each county and city in North Carolina is in competition for new job opportunities for its citizens. To be truly competitive, we must offer more.

There's always been a close connection between the educational level of the citizens of a community and its economic growth and development. The TECH PREP program provides students an opportunity to become part of a technically sophisticated workforce which can attract new industries and businesses.

A high school diploma is no longer the ticket to a good paying job. We need to consider the idea that a person's education should span at least 14 years - high school plus two years at a technical or community college and the commitment to lifelong learning.

The job market doesn't demand a great number of four-year college graduates. It does, however, demand employees who can solve technical problems and share ideas with others.

The TECH PREP program was developed to guide students into courses which will form a firm academic and technological foundation on which to build their futures.

What is Tech Prep?

TECH PREP is a concept designed to meet the need for more students to enter the American workplace with at least an associate degree level of education.

TECH PREP is:

- -A college prep parallel course of study.
- -A course of study for technical careers.
- -A focusing of the "Middle majority."
- -A blending of academic and vocational/technical competencies.
- -An upward direction for "drop-downs."
- -A raising the level of Expectations for the "neglected majority" student.
- -A 4+2 concept with implications for K-14.
- -A total community **leadership** effort.
- -A partnership effort between secondary schools, post secondary schools, business/industry, community leaders, parents and students.

Goal:

More than 75% of all students will complete college prep or tech prep course of study, enter and complete post secondary education and enter the work place appropriately prepared.

Course of Study Criteria

... **Grade level or above English, Math, Science or Social Studies.**

... **Algebra completion required.**

... **Advanced Science required**
ex. - Principles of Technology, Physics, Chemistry, Anatomy, Physiology, etc.

... **Technical courses must be available.**
ex. - Principles of Technology, Electronics, Computerized Accounting, etc.

... **Upgrade Vocational/Technical Courses.**
- •Computer assisted learning
- •Scientific principles/concepts
- •Integrate basic skills
- •Decision making, thinking skills, higher order.
- •State of the art technology.

How to implement?

Administration and staffs from public schools and post secondary educational agencies plan and implement the program together.

A successful Tech Prep program will include ...

...**Secondary and post secondary edutional administrative commitment to Tech Prep**

...**General Staff orientation**
Changing needs in workplace and resultant educational needs for "Neglected majority" students.

...**Articulation - Curriculum Review**
Develop 4+2 program
Close curriculum gaps
Identify areas students begin to fall behind.
Eliminate unnecessary overlaps.
Provide for Advanced placement.
Business/Industry imput.
(Curriculum teams should include: Language, Math, Science, Social Studies, Guidance, all vocational/technical areas)

...**Tech Prep Course of Study**
Clearly communicated to parents and students beginning at 8th grade level.
Require students to select course of study prior to registration for ninth grade.

...**Staff Training**
(Examples) Learning styles, motivational strategies, teaching students to apply, state of art technology.

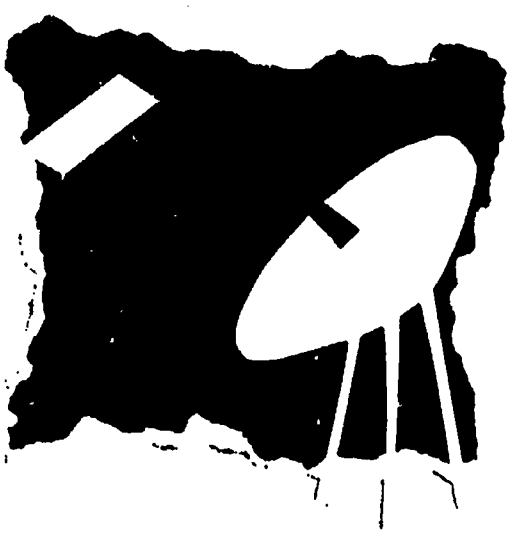
...**Comprehensive Career guidance program K-14**

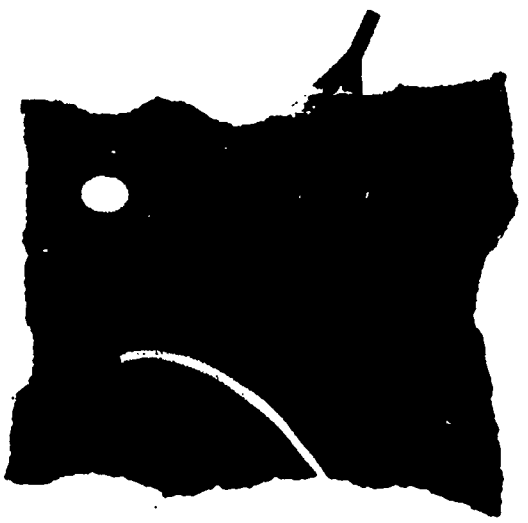
...**Extensive internal and external marketing**
- •Educators
- •Students
- •Parents
- •Employers
- •Entire Community

...**Monitor Results**
- •Course of study enrollment
- •Algebra enrollment
- •Advanced Science enrollment
- •Drop out rate
- •SAT Score
- •Graduation intentions
- •Follow up after graduation
  - •4 year college
  - •2 year college
  - •Military
  - •Work place

...**Review and Revise Annually**

YOUR GUIDE





TO SUCCESS

TWO + TWO

Solving the college dilemma is as easy as 2 + 2.

What is the 2 + 2 solution?

A high school student can combine the last two years of high school with a pre-selected two-year program at Portland Community College. The sum of the 2 + 2 program is an associate degree and qualifications needed for entering a technical career. If your goal is a four-year baccalaureate degree, you can arrange a similar combination and then transfer to a four-year college or university.

How does a 2 + 2 program change what you study in high school?

The answer depends on what you plan to do after you graduate from high school -- even if your plans are tentative or indefinite right now.

Fact: Better entry-level jobs, and careers with a future, require more than a high school diploma.

You should be preparing for further education and training while still in high school.

College or technical preparation are two options you should consider and compare:

	College Prep	Tech Prep
Prepares you for pursuing a four-year baccalaureate degree		
Prepares you for pursuing a two-year associate degree		
Provides you with a broad academic education		
Satisfies high school graduation requirements		
Includes specific course recommendations to prepare for college		
College credits can be earned through high school courses		
Designed to meet four-year college entrance requirements		
Designed to prepare you for entering a community college		
Emphasis is on vocational technical preparation and academic preparation		
Last two years of high school are connected with a two-year college program		

Therefore, the courses that you elect to take in high school depend on whether you choose to follow a Tech Prep or college prep program.

Are there admissions requirements?

A Tech Prep program in high school will allow you to easily meet the admissions requirements for nearly all Portland Community College's programs.

In addition, you may be able to earn college credits before graduating from high school. These credits can be applied toward your associate degree when you enroll at PCC. Your counselor or teacher will be able to tell you how you can earn these credits in high school. Admission to PCC is open to all, but Tech Prep students definitely have a head start over other high school graduates who may enroll.

Is advising available?

Your high school counselor will be able to give you general information about 2 + 2 Tech Prep and associate degree programs.

Advising is also an important part of the student's program at PCC. Students will receive both general academic advising and specific advising needed for the program they choose.

Are there support programs available for special needs?

Portland Community College has the following support services for students:

- Adult Basic Education
- Alternative Learning Center
- Counseling and Advising
- Developmental Education (Reading, Writing, Math)
- English as a Second Language
- Handicapped Student Assistance
- Tutoring/Technical Learning Skills

Is financial aid available?

Through Portland Community College, students have access to the same kind of financial aid packages available from other public colleges. There are basically three kinds of financial aid for college: (1) Scholarships and grants, (2) loans, and (3) work study.

Is there help with job placement for graduates?

The Office of Student and Graduate Job Placement is a job referral service for PCC students and graduates. Services include employee contact to develop job openings, recruitment by employers, and direct student assistance with resume writing, interviewing techniques and job search development.

Credits in cooperative education (work experience) are required in some programs and optional in others. Cooperative education students are placed with employers during part of the training at PCC.

Why Portland Community College?

Students who are attending one of the 27 public high schools in the PCC district, can take advantage of the 2 + 2 Tech Prep and associate degree program. These high schools are located in the following school districts: Banks, Beaverton, Forest Grove, Gaston, Hillsboro, Newberg, Lake Oswego, Portland, St. Helens, Scappoose, Sherwood, Tigard and Vernonia.

An alliance between these high schools and PCC makes the 2 + 2 Tech Prep and associate degree connection possible. This alliance has been formalized through an organization called the Portland Area Vocational Technical Education Consortium (PAVTEC).

SUCCESS

How do you start a 2 + 2 Tech Prep associate degree program?

Checklist for high school students.

9th and 10th grades.

Begin thinking about your career

Find out as much as you can about 2 + 2 Tech Prep and associate degree programs

Discuss your future goals with your parents, counselors and teachers

Look at potential 2 + 2 Tech Prep and associate degree programs when choosing your elective courses

Take challenging courses, especially math and science

Develop good reading and communication skills.

11th and 12th grade.

Choose a tentative career direction

Obtain advice and help in choosing Tech Prep electives

Register for advanced credits in the Tech Prep courses

Continue with required high school courses to graduate

Make plans for enrolling in the two-year associate degree program at PCC

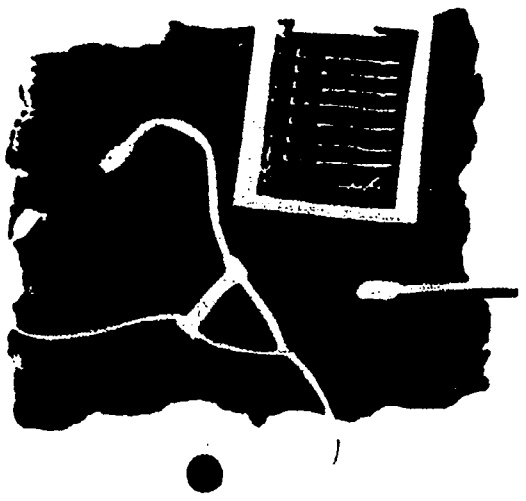
What if you change your mind after you start a 2 + 2 Tech Prep associate degree program?

You still have plenty of options. Why? Because you will have been taking academic courses at the same time you were taking the vocational technical courses. Therefore, you should have a solid academic foundation which would aid you in succeeding in other programs.

PCC AAS degree programs

Accounting
Administrative Secretary
Agricultural Mechanics
Alcohol and Drug Counselor
Architectural Drafting
Auto Body Repair
Automotive Service Technology
Aviation Maintenance Technology
Building Technology
Business Management
Commercial Art
Computer Field Service*
Computer Programmer/Analyst
Computer Software Technology
Criminal Justice
Dental Hygiene*
Dental Laboratory Technology*
Diesel Service Mechanic
Dietetic Technology
Early Childhood Education
Electronic Engineering Technology
Electronic Service Technology*
Engineering Technology-Civil
Engineering Technology-Mechanical
Fire Protection Technology
Graphic Reproduction
Hotel-Motel Management
Industrial Drafting
Industrial Illustration
Interpreter Training Program
Jewelry-Professional Skills
Landscape Technology
Legal Assistant
Machine Technology
Management Supervisory Development
Media/Library Assistant
Medical Laboratory Technology*
Medical Record Technology*
Merchandising
Nursing*
Opticianry*
Radiologic Technology*
Real Estate
Restaurant Management
Secretary-Admin. (Office Management)
Secretary-Admin. (Word Processing)
Secretary-Legal
Sous Chef
Veterinary Technology*
Vocational Music
Welding

*Program with pre-admissions requirements.



How do you choose a 2 + 2 Tech Prep program?

Think about what kind of career you want. Talk to your parents, teachers, counselors, and friends.

Find out what is available. At Portland Community College, there are over 50 different career programs to choose from. Each one offers a two-year associate degree. These programs are listed in this publication.

Your counselor can show you a Tech Prep Planner or Student Guide to 2 + 2 Tech Prep programs. These will tell you about the associate degree programs at PCC and how to select Tech Prep courses for each one.

Remember, your Tech Prep program includes both academic courses and vocational technical courses. You will need both to prepare for the associate degree and a job.

What can you study at Portland Community College?

To earn a two-year associate degree in any one of the over 50 associate of applied science degree programs, you will be required to take academic courses as well as vocational technical courses.

Academic courses will include Arts and Humanities, Science and Mathematics, and Social Sciences. These will make up approximately 20 percent of your degree program. You will take the vocational/technical courses matching the requirements for the program that you choose.

See the last page of this brochure for a complete listing of these programs.

What are the advantages of 2 + 2 Tech Prep programs?

Expand your career options.

A better education usually means a better job. If you are not one of the twenty-five percent who will earn a four-year college degree, you will be one of the seventy-five percent competing for other jobs.

The two-year technical degree will place you head and shoulders above the general high school graduate who is applying for a job or looking for a job advancement.

Save time and money.

Earn college credit while still in high school. During your junior and senior year, you can earn credits toward the associate degree at PCC. Therefore, you save time and money when you enter the college program. You then have time to take more classes or to work part time.

Tuition costs are lower.

Here are the estimated tuition costs for one year at Oregon Colleges:

Oregon Community Colleges	State System Colleges and Universities	Independent Colleges and Universities
$675	$1,500	$ 4,585-$10,600

For more information:

Talk with your high school counselor or teachers. Contact the Office of Admissions, Portland Community College, 12000 S.W. 49th Avenue, Portland, OR 97219. Telephone: 244-6111.

Appendix D
Sample Newsletters

PAVTEC Newsletter

March 1990 Portland Area Vocational/Technical Education Consortium

PAVTEC receives $810,000 in Workforce 2000 funds

The Portland Area Vocational/Technical Education Consortium received $810,000 in state funding through the Workforce 2000 grant, according to Don Johnson, PAVTEC chair.

The funds, available April 1, 1990, through June 30, 1991, are targeted for 2 + 2 vocational/technical programs, student leadership development, business and industry internships, and state-of-the-art computers and equipment.

"The grant will allow PAVTEC high schools and Portland Community College to expand 2 + 2 efforts and emphasize technology education in several high priority areas," says Johnson.

Those areas include hospitality, tourism, and recreation; construction; manufacturing technology; trade and marketing; and the health care field.

Students at Portland Community College, and in high school districts including Banks, Beaverton, Forest Grove, Gaston, Hillsboro, Lake Oswego, Newberg, Portland, St. Helens, Scappoose, Sherwood, Tigard, and Vernonia will benefit.

Dan Dunham, a consultant to PAVTEC, says he expects the high school graduation rate to increase as a result of the PAVTEC program expansion. "There will be funds provided to help keep kids in school through better programs tailored to their needs and the needs of the work force," he says. "We want to provide a broad education while increasing students' technology quotient."

Since the quality of instruction hinges directly on the teachers' ability to translate industry experience to the classroom, the funding will provide summer internships to give vocational teachers an opportunity to work in business and industry. It will also provide the resources to write and buy new curriculum and develop new programs.

A regional Special Needs Assessment Project and a Fred Meyer Internship Program will also receive funding as part of an effort to reach the at-risk population.

Another funding goal is to help stimulate the economy and to increase productivity.

"Oregon has an edge in the international marketplace," says Dunham. "This productivity should be enhanced by improving the workforce.

"Through improved training, we could produce workers who could work at 100 percent of their productivity by the end of their first year of employment," he adds. "We expect young people to achieve who come through these programs."

Through a close partnership with business and industry, PAVTEC plans to provide education that keeps pace with the latest industry standards.

Advisory groups, formed with the Associated General Contractors, Portland Private Industry Council, Oregon Department of Vocational Education, Oregon Alliance, Tektronix, and Washington County ESD, will help meet this goal.

2+2 Tech Prep Guide Planner now available on disk

The PAVTEC 2 + 2 Tech Prep Guide Planner has just been updated by Al Miller, Carol Lee Boone and Donna Montee, and is now ready on disk.

The planner lists the Portland Community College associate degree requirements in each field. The latest information on wages and employment opportunities, compiled from the Oregon Career Information System, is included.

Each course outline has a column left blank, so high schools can input their own information, including required courses during junior and senior years, and electives and articulated classes that lead into community college courses.

The guide is available on disk to all high schools in Region IX. To receive your copy, call Donna Montee, 244-6111, ext. 2576.

PAVTEC's Mission

PAVTEC's mission is to enhance and strengthen the working partnerships between Portland Community College and the high schools of Region IX to provide the highest quality articulated vocational-technical courses and programs possible to the citizens of the Portland area.

Building construction leaders prepare to form agreements

Partnership was the byword when building construction leaders in education, business, and industry gathered recently at Rock Creek Campus for a PAVTEC articulation dinner meeting.

The gathering met in the building construction area, where building instructional staff led a tour of the shops. Participants then broke into groups and discussed curriculum and PAVTEC opportunity.

The meeting helped pave the way toward the goal of forming agreements to link high school building construction courses with two-year construction trade programs at Portland Community College.

Leaders from the Associated General Contractors and the Oregon Bureau of Labor and Industries were on hand to urge high school educators to alert students to the abundance of good jobs in the construction fields and to provide them with the current technical skills necessary to compete for those jobs.

Although there are good opportunities in building construction trades, many students may not be aware of them, according to Bill Bryant, a field representative with the Associated General Contractors.

There is a high drop-out rate in high schools in this state, Bryant added. "We need to build together a closer relationship with the schools. We have to recruit the students. We've got to build some bridges for the kids."

B-FIT Director Gail Smith

Next year, when building construction articulation agreements are formed, students could gain college credits through high school vocational courses, and at the same time, ease their transition into community college training programs.

Jeff Triplett, associate director of the Oregon Bureau of Labor and Industries, said that employers have been forced to lower their application standards due to a dramatic drop in the number of job seekers available. At the same time, builders need workers with applied math and science backgrounds and the ability to relate those skills to their desired trade.

"Math anxiety is the most serious handicap our students have," says Gail Smith, director of the Building Futures in Industry and Trades Program at Rock Creek. Trades math is one of the courses students must complete in the B-FIT program, which trains women for construction careers. "When they leave, they're ready to be employed," she adds.

Don Johnson, PAVTEC consortium chair, announced a $810,000 grant award for articulation and regional projects, noting that building construction articulation will be a priority. "There are dollars in this grant for regional curriculum and staff development in construction. We are delighted to have Associated General Contractors involved in this effort."

> ***"We need to build together a closer relationship with the schools."***
>
> **Bill Bryant**

Johnson commended Dolores Turville for her fine work in program improvement and talked about the important part high school and college faculty play in this grass roots effort. "We believe very strongly that it is the faculty that makes this program successful. We have 74 agreements in the files, and these have come through the faculty. PAVTEC is pleased to give stipends to teachers in recognition of the hard work involved in making the program work."

The strong support and leadership from PAVTEC consortium representatives is another crucial factor that helps make PAVTEC function so well, Johnson added.

"We're very proud of our fine high school and community college building construction faculty," says Turville. "We look toward the future and look forward to the partnerships we hope to form with the high schools, as well as with business and industry, in making these agreements."

Portland Area Vocational-Technical Education Consortium

Consortium Chair	Don Johnson
Program Improvement Coordinator	Dolores Turville
Special Needs Chair	Sherry Robinson
Special Needs Coordinator	Linda Skaug
Newsletter Writer	Mary Nelson
Newsletter Editing and Layout	Christie Gray
Printing	Washington County ESD

Regional Coordinators

Ron Munkres	Washington/Columbia Co. ESD
Warren Rathbun	Portland Public Schools

Members: *Portland Community College; Region IX High School Districts (Banks, Beaverton, Forest Grove, Gaston, Hillsboro, Lake Oswego, Newberg, Portland, St. Helens, Scappoose, Sherwood, Tigard, Vernonia); The Portland Private Industry Council; Oregon Department of Vocational Education; Oregon Alliance; Washington County ESD, Tektronix.*

Technical Occupations pilot project planned for Roosevelt High

A pilot project is in development and may be put into place soon at Roosevelt High School, according to Ken Kline, Industrial Technology Education Specialist for the Portland Public Schools.

The Technical Occupations Preparation Project, or TOP, would start at the ninth grade level, with students taking keyboarding, drafting, and principles of career success, along with the applied math, science, and English classes which serve as a core and make the academics more relevant. The project is designed for students who want to go straight into the work force or into a two-year college or technical training program after high school graduation.

Turville represents PAVTEC at St. Helens Metals Trade Fair

Dolores Turville, PAVTEC program improvement chair, attended the recent St. Helens High School Metals Trade Fair as a PAVTEC representative. Jim Syrstad, welding instructor at St. Helens High School, planned the event.

Turville was on hand to provide information about the 2 + 2 program, in which students earn Portland Community College credit through high school vocational classes.

Turville used the St. Helens 2 + 2 Tech Prep Guide to show middle and high school students and their parents how St. Helens vocational classes can lead into a two-year community college technical degree.

She also answered questions about the financial savings. In the PAVTEC articulation program, high school juniors and seniors can earn PCC credits for an annual $10 fee.

Survey reveals need for more information regarding special needs

by Sherry Robinson

In a survey conducted by the Special Needs Task Force, vocational instructors throughout the PAVTEC Region identified a strong need for further information concerning special needs students.

On April 5, Jorge Espinosa, Portland Community College Affirmative Action Director, will lead a workshop addressing "Ethnic Minorities in the Classroom." Additional information about this workshop will be coming to you soon.

In addition to the workshop, the Special Needs Task Force is developing a video to accompany the PAVTEC 2 + 2 Tech Prep Video, which will focus on the identification of special needs students, as well as the barriers which restrict their participation and success in vocational programs. This video will be approximately 12 minutes in length and should be a valuable and easily utilized informational tool for staff meetings, in-service workshops, or just individual viewing.

Other exciting projects from the Special Needs Task Force include:

- The Special Needs 1990-92 Directory.
- New transition forms, for use with high school students who need special assistance.
- Vocational program advising sheets which provide detailed information about the programs available.

For more information or additional copies, contact Sherry Robinson, Portland Community College, 244-6111, ext. 7249.

March 8 Transition Fair successful

A Transition Fair, held March 8 at Cascade Campus, attracted about 100 Special Needs students who listened to the trumpet sounds of Thara Memory, while they visited booths on vocational opportunities which included fire science, electronic service technology, and ophthalmic dispensing. Representatives from student support systems were also on hand.

Special Needs Transition Fair set for April 17

Disabled students, and those who are academically or economically disadvantaged, are invited to a Special NeedsTransition Fair at Rock Creek Campus on Tuesday, April 17, from 9 to 11 a.m.

The fair, which is open to all area high schools and Portland Community College, will begin with a greeting from Executive Dean Betty Duvall. Cheryl Macy of admissions will moderate an orientation for the 120 expected students, and eight guides will lead a tour of the campus.

Then, it's back to the Pioneer Room to visit information booths representing all the vocations on campus. An instructor will be on hand at each booth, so students can meet the teachers informally and ask questions.

Pipe wrenches, saws, and other tools of the trades will be on display to help students visualize themselves in that occupation.

"We're trying to encourage students and to be of help in their transition between high school and college," says PAVTEC Special Needs coordinator Linda Skaug.

"Most of these students have not been successful in academic settings," she adds. "We want to help students realize they can be successful in vocational areas."

Vocational teachers invited to participate in Assistantship Program

Vocational teachers now have the opportunity to work in industry as part of the recently expanded Assistantship Program, developed by the Business Education Compact of Washington County.

Shop teachers work in machine shops and manufacturing to see computer-controlled automation in action. Others work in high technology to learn about the latest in electronic testing equipment.

"Teachers gain a better perspective of the business world and learn new ideas to apply to their curriculum," says Compact executive director Tamra Busch-Johnsen.

Previously available only to Washington county teachers in certain fields, the Assistantship Program will now include the vocational-technical occupations and will be available this summer to all vocational-technical teachers and counselors in PAVTEC Region IX.

The Compact's Workforce 2000 Committee, co-chaired by Alan Miller of the Hillsboro High School District and Betty Atteberry of the Sunset Corridor Association, endorsed this expansion, made possible by the Workforce 2000 grant.

Funds for three-week summer assistantship opportunities will be available for a limited number of people. Ninth grade through higher education vocational teachers, counselors, and administrators in Banks, Beaverton, Forest Grove, Gaston, Hillsboro, Lake Oswego, Newberg, Portland, St. Helens, Scappoose, Sherwood, Tigard, Vernonia, and Portland Community College are eligible. For information, call JoAnne Forman, 627-5505.

Presentation at CORD conference highlights excellence in articulation

PAVTEC has experienced tremendous growth in its three years in operation and has become known across the county for excellence and innovation in articulation.

Don Johnson and Alan Miller of PAVTEC were asked to share the plan that led to that success at a conference held by the Center for Occupational Research and Development last fall.

When PAVTEC began in 1986, says Johnson, "some students in the high schools and community college districts were not aware of advanced opportunities for them. Some teachers, too, were not aware of future opportunities for their students. To help them become aware, agreements were formed. PAVTEC supports those agreements from a centralized approach."

There are several key ingredients that make PAVTEC successful. "High level administrative support is terribly important," says Johnson . "You need the dollars too. You need a budget to work within and the funding to provide financial recognition for the teachers who make this possible. You also have to convince people that this is a good thing for their students."

Another extremely important factor is the "grass roots" approach. Members of the high school faculty work with the community college faculty to develop articulation agreements.

PAVTEC also works to integrate English, math, and science classes with vocational courses to make the academic subjects more relevant to students.

The PAVTEC consortium works within a framework. Each year we've extended and refined the plan, working to overcome obstacles such as apathy, funding problems, and turf issues.

"The three-year plan helps break down the barriers," says Johnson . "And PAVTEC'S tremendous growth is proof that we've found some of the right combinations."

Applied math debuts at Jefferson and Wilson Highs

Applied math has been adopted by Jefferson and Wilson High Schools for the 1990-91 school year, according to Ken Kline, Industrial Technology Education Specialist for the Portland Public Schools. Benson High School adopted the applied math program two years ago and continues to use it successfully, he adds.

"The program uses a series of video tapes and instructional units to teach arithmetic operations, problem solving, estimation, measurement skills, geometry, simple statistics, and algebraic formulas to solve problems," he says, adding that students with different learning styles do well in applied studies. "We're trying to make the math and other academic programs flexible and adaptable enough to fit the special needs these students have.

"Integrated learning is a concept we're trying to push at both the high school and the middle school level, and we're making progress."

'Future Makers' program focuses on creativity

The Workforce 2000 committee is always looking for new ways to improve technology education, and the Saturday Academy "Future Makers" inventor-mentor program was just what they were looking for.

Middle school students in Washington, Multnomah, and Clackamas Counties use 10 to 12 class sessions to focus on problem solving, inventions, and creativity.

Students work in teams, visiting a business site to identify a problem area. They brainstorm, then come up with a creative solution.

Forty-three teachers are taking part in "Future Makers,"this year. The program is hosted by the Oregon Graduate Institute. For more information, call Gail Whitney, director of the Saturday Academy, 690-1190.

Benson High School 2+2 Demo Project serves as model

The 2 + 2 Demonstration Project at Benson High School is off to a good start this year with sophomore drafting students articulating horizontally, (working on joint projects within their building), with the math, science, and English departments.

The drafting program is also connected with Portland Community College. Benson drafting students earn up to 20 college credits per year, taking drafting classes held at their own high school.

"The goal is to set up as close to an ideal 2 + 2 program as possible to serve as a model for any situation in any high school," says Scappoose principal and Demonstration Project director Robert Hammann.

Hammann hopes the project, in effect two years this spring, will reach that goal with the help of funding from the Workforce 2000 Grant. With these funds, project leaders hope to enlist the help of high school and college faculty to plan and develop the articulation program.

Benson High drafting department chairman Gary Beck assists students Jeremy O'Leary and Tri Pham.

Meanwhile, the Benson High School staff has been busy. "We've already done a lot of the work here," says Benson drafting department chairman Gary Beck. "We've laid the groundwork. For a long time, there's been a wall between vocational and academic classes. We're gradually breaking that down."

> ***"The goal is to set up as close to an ideal 2 + 2 program as possible to serve as a model for any situation in any high school."***
>
> **Robert Hammann**

For instance, Benson students learn how to apply their advanced math and technical writing skills in drafting class. Benson junior and senior engineering and architectural majors spend half their drafting time on the drawing board and half their time on the computer, where they learn the same leading-edge AutoCad and Cadkey technology used in industry and taught at Portland Community College.

Impact evaluation finds enthusiasm and excellence in PAVTEC

High school students say the 2 + 2 and Regional Cooperative Vocational Technical programs gave them a reason to stay in school and helped them focus on career plans, according to a recent impact evaluation report.

The evaluation, written by a team from the Oregon Alliance for Program Improvement at Oregon State University, found students motivated to get a head start on college through involvement with the two programs.

Students applauded the wide selection of college credit classes available at connected high schools, and said they enjoyed saving money on tuition and books when they started their college education early.

The report showed a marked improvement in counselor and teacher understanding, participation, and enthusiasm. The number of schools, districts, and people involved in the program also showed a great increase.

Other important accomplishments included major advances in all areas of special needs. The study found greater numbers of handicapped and disadvantaged students involved each year, as well as increased teacher involvement and local district support.

Both high school students and faculty report they're now more aware of Portland Community College as an important education option, and say the college's image has improved in their minds.

The report gives credit to the "excellent program management, leadership, and steering committee," and lauds their top quality record keeping and reporting.

The evaluation team made the following suggestions:

- Prepare a marketing program for advisors and counselors to attract freshman and sophomore students.
- Use the tracking system to see if program graduates learned skills matching the needs of local and regional employers.
- Develop closer ties to JTPA to include students in short-term training.
- Form a subcommittee to review multiple textbook use. Standardize manuals and texts.
- Update the resource library for the region, and include copies of material on RCVT and 2 + 2 programs.

4+2 Tech Prep: A model for success in North Carolir

In a recent article in the "Community, Technical, and Junior College Times," Joseph W. Grimsley discussed a successful 4 + 2 technical preparation program he helped initiate at Richmond High School in North Carolina.

The goal was to reach the drop-out target group and to prepare students for the technical jobs of the future. Administrators created a computerized guidance center to help high school students focus on career choices. Students took home a copy of the counseling results, and parents co-signed the registration selections.

The 4 + 2 steering committee surveyed Richmond Community College faculty and found that all high school students needed algebra II completion in order to be successful in all RCC associate degree programs. With this goal in mind, Richmond High math teachers offered algebra IA to students rating 36 to 49 on the CAT. Students took algebra IB the second year, geometry the third, and algebra II in the senior year.

The results were phenomenal. Seventy-five percent of ninth graders take algebra I or IA, and the end-of-course state tests for algebra I have improved 15 percent.

In addition, SAT scores went up from 778 to 819, and the rate of students going on to community college increased from 25 to 44 percent.

To prevent the "drop down" situation which had occurred at Richmond High as the neglected majority lost interest and selected the easiest classes, grade level courses in English, tech prep, social science, and science were made mandatory.

Challenging tech prep vocational courses including computerized drafting, electronics, industrial technology, entrepreneurship, and computerized accounting were added.

"The first tech prep students have just graduated," Grimsley wrote in the Times article. "Whether they go directly to college, the military, or to work, they will be better prepared."

Upcoming Inservice Plan

International Trade and Mktg:
A Teachers' Workshop
April 6 & 7 and May 5
Portland State University

Electronics Technology:
Program for the 90s
Teleconference
May 2
PCC Rock Creek

Cooperative Learning:
Improving Social and
Academic Skills
May 11 & 12
Washington County ESD
PSU credit available

Technology Education: Content
June 18-22
Hillsboro District

Technology Education: Process
June 25-29
Portland District--CDE

Principles of Technology: Level 1
June 18-22
Benson High School/PAVTEC

Detailed information on inservice will follow.

PAVTEC Schedule of Meetings

Consortium Representatives Meetings

Full membership meetings:	3-5 p.m.	March 14
Rock Creek Campus	11:30 a.m.-3:30 p.m.	April 16*
Pioneer Room, Building 3	3-5 p.m.	June 13

PAVTEC strategic planning:

Franciscan Renewal Center 0858 S.W. Palatine Hill Road (RSVP)	8 a.m.-4 p.m.	May 9

Steering Committee Meetings

Meetings held the first Friday		April 6
of each month:	7:30-9:30 a.m.	May 4
Golden Goose		June 1
Rock Creek		Aug. 3
		Sept. 7

Special Needs Task Force Meetings

Meetings held the second Friday		April 13
of each month:	1:30-3:30 p.m.	May 11
Rock Creek Campus		June 8
Community Room, Building 3		

**April 16: The superintendents/president's meeting will be held 11:30-1:30 in the Pioneer Room. The regular consortium meeting will be held 1:30-3:30 in the Community Room.*

For information regarding consortium or steering committee meetings, call Don Johnson at 244-6111, ext. 2573. For information regarding special needs task force meetings, call Sherry Robinson at 244-6111, ext. 7249.

PAVTEC
Portland Community College
P.O. Box 19000 - RIC B-1
Portland, OR 97219-0990

TECH PREP NEWS

A publication of the Partnership for Academic and Career Education (PACE), a business-education partnership initiating Tech Prep programs for students in Anderson, Oconee and Pickens counties of South Carolina.
Volume IV, No 3 *Spring, 1991*

Local Tech Prep Initiative Nation's Best

...Anderson, Oconee and Pickens Counties Take Top Honors

by Anita Turlington

The PACE Tech Prep initiative in Anderson, Oconee and Pickens counties has been named the top Tech Prep program in the nation by the U.S. Department of Education. In addition, the program is one of three recipients nationwide of the American Association of Community and Junior Colleges' inaugural Tech Prep/ Associate Degree Partnerships Award.

Both awards are given in recognition of the unique approach to Tech Prep taken by schools in Anderson, Oconee and Pickens counties. According to Diana Walter, PACE Executive Director, "These awards really recognize the excellent work our schools have been doing and were doing before anyone had even heard very much about Tech Prep." She added that the qualities unique to this program include a comprehensive approach; effective collaboration between secondary and postsecondary educators; extensive involvement of business and industry partners; and creative thinking on the part of counselors, teachers and school districts. "Besides," she added, "we have some of the finest teachers of applied academics *anywhere*."

In his announcement of the AACJC award, Dr. Dale Parnell, president of the Association and author of The Neglected Majority, said that PACE "has earned the right to show the way to other educational leaders throughout the nation. You didn't wait for outside money or federal legislation. You saw a problem and a set of tools."

Roy Herron, immediate past chairman of the PACE Coordinating Board and superintendent of Anderson School District Three, wrote in his nominating letter for the award that "the Tech Prep concept has proven to be one of the most exciting and innovative educational movements to come along in decades."

Both awards were presented Sunday, April 14, at the 71st annual AACJC national convention in Kansas City, Missouri. Betsy Brand, Assistant Secretary of Education, presented the awards to Dr. Don Garrison, president of Tri-County Technical College and member of the PACE Coordinating Board. Dr. Garrison accepted the awards on behalf of the PACE partnership. A cash award of $2000 also accompanied the AACJC award. PACE committee chairmen will meet soon to decide how best to spend the money to benefit all members of the consortium.

Betsy Brand, Assistant Secretary for Adult and Vocational Education, U.S. Department of Education (right), presents the top national award for Tech Prep program excellence at the recent AACJC Convention in Kansas City, MO. Accepting the award on behalf of the PACE partnership is Dr. Don C. Garrison (left), president of Tri-County Technical College and PACE Board member, and Diana Walter (center), PACE Executive Director.

Wren ITE Students Test New Technologies

by Johnny Wallace

Solar-powered water heaters and programmable robots—Wren High School's Industrial Technology Education students do not use "typical" high school lab equipment for their projects. According to teacher Terry Corder, "Industrial Technology Education (ITE) is the high school's answer to a rapidly changing, high-technology workplace." The program, available in several schools across South Carolina, allows students to examine some of the new technologies available and determine their impact on the workplace. Because of this emphasis on new technologies and its "hands-on" aspect, ITE is often used as an introductory course in Tech Prep curricula. Wren's program has been named by the S.C. Department of Education as a Model ITE Program.

Students in ITE have the opportunity to explore technology concepts in four cluster areas: communication,

continued on page 2

continued from page 1

construction, manufacturing, and transportation/power and energy. Each of the cluster areas provides students with hands-on applications and insights into technology and career opportunities. Students study such concepts as electronics, computer-aided design, and computer numerical control (CNC) processes.

Mr. Jeff Tiller, President of Southface Energy Institute of Atlanta (kneeling), instructs Wren High School students (left to right) Jason Cooley, Lee Wellman, Robbie Holden and Tony Houston on the proper procedure for installing solar panels.

Corder is always looking for ways to expand the course and is currently developing a program which will integrate robotics and computers into a simulated manufacturing process. Students will have the opportunity to design a "product" using computer-aided technology; have the computer write a program to create the product; and then see the product assembled through the integration of robotics, lathing machines and computers.

A current project for the students involves converting the power source for the hot water heaters in the cafeteria to solar power. Made possible by a grant from the S.C. Department of Energy, Agriculture and Natural Resources, and under the guidance of Jeff Tiller, president of Southface Energy Institute of Atlanta, the project will allow students to learn basic concepts of solar power and will enable them to put these concepts into practice.

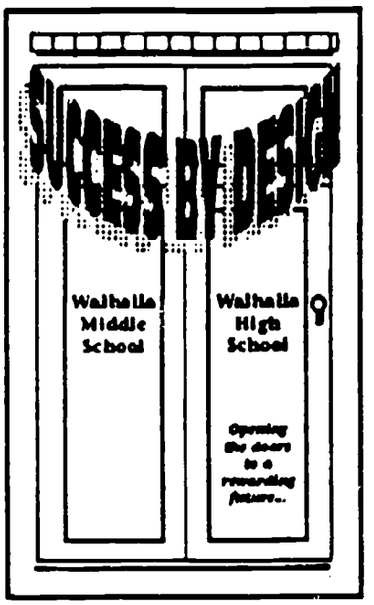
Corder has been awarded several honors because of his enthusiasm and interest in technology education. He has presented at such conferences as the 1990 NASA Educational Workshop for math, science and technology teachers and the 1989 Southeastern Industrial Technology Educators conference.

For more information about the Industrial Technology Education program, contact Terry Corder at Wren High School, 232-4842.

TECH PREP
PREPARATION FOR TECHNOLOGIES

Walhalla Schools Develop 'Success By Design'

by Rick Murphy



Counseling staffs at Walhalla Middle School and Walhalla High School, working cooperatively with members of the PACE staff, have developed a brochure for eighth graders at the middle school to use as they plan their high school curriculum choices. The counseling staffs of the two schools are instituting a comprehensive, cooperative career awareness program beginning in the middle school years. The brochure, entitled "Success By Design" to correlate with the high school's *Career Bound Plan Book*, encourages rising ninth graders to plan carefully and provides them with a quick reference guide to suggested courses of study for both Tech Prep and College Prep curricula in five career areas.

"Our eighth graders will have so many opportunities available to them in the new curriculum structure -- we want to be sure that they know about these opportunities early enough to take advantage of them and plan wisely for the future," said Delane McJunkin, occupational specialist at the middle school. Walhalla High School recently eliminated its general track, replacing it with what the school calls "Two-Year College Prep" (Tech Prep). Although it is too early to have a general response from students and parents, McJunkin added, the faculty and staff from both schools involved are pleased with the brochure and expect it to be successful.

For copies of the Walhalla publications, contact Rick Murphy at the PACE office (646-8361, ext. 2381).

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Partnership for Academic and Career Education
P.O. Box 587 • Pendleton, SC 29670
(803) 646-8361, ext. 2107
Editor: Johnny M. Wallace, PACE associate director/curriculum developer
Newsletter Assistant: Donna Branham, PACE secretary

A Practical Approach To Chemistry

By Johnny Wallace

Wren High School juniors (left to right) Shawn Gunshore, Talitha Ellington, Shana Johnson and Julie Phillips test various household products as part of a ChemCom lab exercise.

Chemistry in the Community (ChemCom), an applied high school chemistry course developed by the American Chemical Society, is designed to help students examine chemistry and how it relates to the local community. The course consists of eight units ranging from chemistry in the environment (water, air, climate) to nuclear chemistry. ChemCom also gives students a look into the workings of the chemical industry in general and a typical chemical manufacturing plant. An introductory course, ChemCom is designed for students who will pursue a career that is not heavily science-based.

The course presents practical applications of chemical concepts and shows students how these concepts affect them. According to Meredith Hammond, who teaches ChemCom at Wren High School, ChemCom requires high-level critical thinking. Because many of the labs are open-ended, students must make judgments about the concepts presented in class and form their own opinions, not just accept "what they are told." Sybil Fanning, ChemCom instructor at Seneca High School, agrees. Because the course requires creative thinking and working in a cooperative learning environment, she said, students have to develop new work and study strategies that are similar to those they will need later on the job.

When asked about the course, Wren High Junior Shawn Gunshore stated, "Lab experiments are not necessarily 'wrong'. There is always the chance to conduct the lab experiment a second time to get the 'right' answer." Junior Julie Phillips said, "To get the requirement completed, we work with each other. We have to work together to get things done." Junior Shana Johnson added that she "likes the lab exercises best. They make the course more interesting."

Training sessions for ChemCom are sponsored by the American Chemical Society. Anyone interested in learning more about the training sessions should contact Mr. Michael Shea, American Chemical Society, Education Division (202) 872-6383 or Johnny Wallace, (803) 646-8361 ext. 2247.

Pickens County: Preparing Students For Tomorrow's Careers

by Anita Turlington

An emphasis on career awareness starting in kindergarten and curriculum reform in high school math and English are the most unique characteristics of the Pickens County School District's PREParation for the TECHnologies model. Pickens County schools will begin full implementation of the model in the fall, said James Williams, Director of Management Information Systems and Vocational Education.

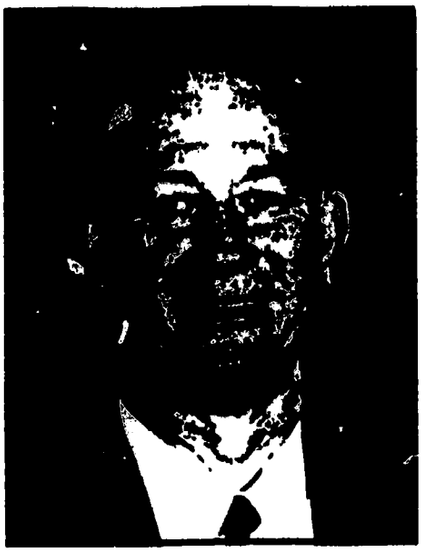
In Pickens County's model, students in kindergarten through grade 5 learn about the many kinds of careers which now exist in the workplace, including mid-level technology careers. Career exploration allows students in grades 6 through 8 to engage in structured activities to begin focusing on specific career clusters. Then, a course component introduced this year at Pickens Junior High School called "Introduction to Careers" wraps up these career exploration activities as students are guided through filling out a career planning flowchart for high school and college.

During the high school years, students will be offered a curriculum that blends both applied academics and occupational training. Extensive curriculum reform is being undertaken to add English and math courses using applied content that is both motivational and reality-based. The existing math curriculum has been completely restructured to give students more opportunities to take the most rigorous math classes for which they qualify. Liberty High School is serving as the District's lead school for Tech Prep development and implementation.

The Pickens County model, which has been two years in planning, also provides for the impact of Tech Prep courses on vocational offerings to enhance those offerings as more students with higher academic skills begin taking vocational courses.

The model has already been presented by the School District to several out-of-state visitors from Idaho, Maryland and Virginia, as well as to representatives of several South Carolina school districts. Anyone interested in receiving additional information can contact Mr. James Williams, Pickens County Schools, at (803) 878-7357 or Johnny Wallace (803) 646-8361, ext. 2247.

Meet The Board



Meet Don C. Garrison, President, Tri-County Technical College...

Without Dr. Garrison's vision and leadership, the PACE Tech Prep initiative in Anderson, Oconee and Pickens counties might never have started. After reading Dale Parnell's *The Neglected Majority* in 1985, Dr. Garrison was a man with a mission. He began meeting with district superintendents from the three counties as well as interested business and industry leaders. These meetings laid the foundation for the PACE partnership.

Today, after five years of commitment to the partnership and to Tech Prep, Dr. Garrison is still an active and vital member of the Coordinating Board. Despite an increasingly busy schedule as a college president, he is always willing to make time for issues concerning Tech Prep; he also encourages participation in the program by other Tri-County Technical College faculty and staff. In addition, he has committed the College to significant financial support of PACE activities.

"Tech Prep is the most exciting educational movement I have seen in over 30 years as a teacher and an administrator. This is the beginning of a new era in education. It's just a wonderful thing to be a part of," he said. According to Dr. Garrison, faculty at Tri-County are already noticing that students are better prepared when they enter the College and are more enthusiastic, with clearly defined career goals. However, he added, "the College has some real challenges to meet with Tech Prep. We are going to need to continue to do work in curriculum, counseling and scheduling to keep up with the excellent work being done by our high school teachers and counselors."

Dr. Garrison came to Tri-County Technical College as president in 1971. Before that time he was at Greenville Technical College for eight years. His B.A. and M.Ed. are both from Furman University, and he holds an Ed.D. from Duke University. In his 34 years as a teacher and an administrator, he has garnered many honors. He currently sits on several advisory boards and boards of directors and is a former member of the Executive Committee of the American Association of Community and Junior Colleges. He has also presented or published over 30 conference papers and articles in his distinguished career.

Dr. Garrison and his wife, Carol, who teaches history at Wren High School, reside in Easley, South Carolina.

COUNSELOR'S CORNER

Pendleton High Guidance Counselor Develops Tech Prep Promotional Strategies

by Rick Murphy

Karen Alexander, Guidance Counselor at Pendleton High School, has developed an outline identifying strategies for promoting Tech Prep that will help students and their parents better understand the reasons to choose a Tech Prep curriculum. "Parents especially have to be convinced of the benefits behind Tech Prep," she said. How to develop community awareness and support of Tech Prep is a dilemma that many guidance counselors are now facing.

Alexander's strategies include activities for all participants in the Tech Prep curriculum: students, parents, teachers and counselors. For example, she plans to develop an "alumni program" wherein Pendleton High graduates who have gone on to complete two-year occupational degrees at area technical colleges and have obtained mid-level technology jobs would return to talk to current students about their successes and experiences.

After a recent Career Day presentation, Pendleton High's business partner representative from Gerrish Milliken, Steve Campbell, commented that "Students are asking serious questions about career opportunities. If they can obtain accurate information on prospective careers, they may be able to make wise career choices and will be better prepared employees for the future." Added Alexander, "Business and industry contacts play a vital role in many of the strategies. We've had an excellent response from our area business people!" She cited PACE's *Guide to Area Business Speakers* as a resource she uses to develop new contacts and to find out more about local business and industry.

Alexander has presented her strategies to numerous school districts in South Carolina and recently at a Tech Prep kickoff for Taylor County Schools in Butler, Georgia. In addition, PACE staff have developed handouts and transparencies using her ideas. For more information on "Strategies to Promote Tech Prep," contact Karen Alexander at Pendleton High School, 646-8040. For copies of handouts or transparencies highlighting her strategies, contact Rick Murphy at the PACE office, 646-8361, ext. 2381.

PACE UPDATES...

- Draft versions of modules for Tech Prep English I, developed by Anita Turlington and English faculty from Pendleton High School, are complete. Modules for Tech Prep English II are still being developed. Also under development is an applied oral communications course for eleventh grade students. Developers for this course are Anita Turlington and representatives from Anderson School District Three and Crescent High Schools.
- Diana Walter, PACE Executive Director, was named "Innovator of the Year" by the South Carolina Technical Education Association at their annual meeting February 8, 1991. The award recognizes her leade ship of the Tech Prep initiative locally and in South Carolina.
- The *Guide to Area Business Speakers* will be updated and revised this summer. After a very enthusiastic response from teachers and counselors to the original version, PACE staff have begun contacting contributors and making revisions to ensure that the guide remains current and useful. The updated version will be available in the fall.
- Math articulation agreements for Technical Advanced Placement credit at Tri-County Technical College are complete; English agreements will be completed this month.

How and Why of Tech Prep Partnerships Presented in New Book

by Johnny Wallace

The Tech Prep initiative in Anderson, Oconee and Pickens counties is highlighted as one of four exemplary programs in **Tech Prep/Associate Degree: A Win/Win Experience**, described by its authors as a "how to" book on the development of Tech Prep partnerships.

Written by Dale Parnell, president of the American Association of Community and Junior Colleges, and Dan Hull, president of the Center for Occupational Research and Development, the book contains two chapters written by members of PACE. Harriet Palmer, Physics for the Technologies teacher at Pendleton High School, wrote a chapter on a teacher's perspective of Tech Prep. "This is a program where students can succeed and get excited about their successes," she said. Diana Walter, Executive Director of PACE, wrote a chapter describing the PACE initiative in Anderson, Oconee and Pickens counties.

The book provides such information as a step-by-step guide for developing Tech Prep programs; common issues occurring during the development and implementation of Tech Prep programs; sections highlighting successful Tech Prep programs throughout the country; and special aids, such as handbooks, student guides and computerized databases of course competencies.

Anyone interested in obtaining a copy of the book can write AACJC Publications, 2700 Prosperity Avenue, Fairfax, VA 22031 or call (703) 204-4636. The cost of the book is $32.50.

Training Offered For Applied Courses

by Johnny Wallace

Three summer training institutes for applied academic courses will be offered this June by the South Carolina Department of Education, Office of Vocational Education (OVE). The institutes will provide teachers the opportunity to become familiar with the course materials and equipment used in each course.

The dates for the institutes are as follows: Applied Mathematics, June 10-28, Clemson University; Communications for the Workplace, June 12-25, Winthrop College; and Physics for the Technologies, June 10-28, Clemson University. Two additional institutes for Communications for the Workplace are currently being planned. School districts which received OVE funding for the applied courses must send a participant to each institute for which corresponding funding was granted.

Anyone wishing additional information about the institutes can contact Mr. Jim Horton, OVE, 253-4025 or Johnny Wallace, PACE, 646-8361, ext. 2247.

Additional Math Modules Available

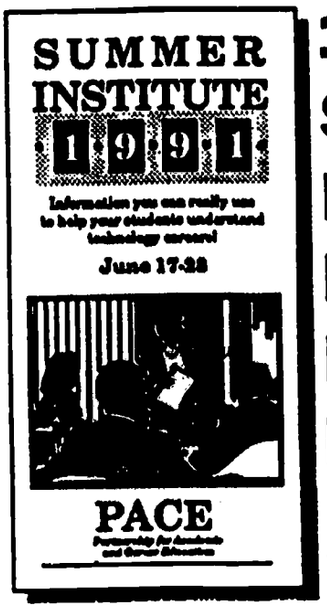
by Johnny Wallace

Four new applied math modules with applications from local businesses and industries are now available from the PACE office. Students using the modules will practice math applications in the areas of veterinary technology, engineering technology, insurance, and textile production. Each of the modules is based on specific tasks a technician would encounter in daily work activities.

Several different types of math applications are used. For example, the engineering technology module teaches students how statistics are used to determine the quality of a product. The insurance applications illustrate how to compute automobile and motorcycle insurance premiums and the impact of traffic violations on the amount of premium paid. The veterinary technology module focuses on the use of decimals, fractions, and metric and standard measurement systems in calculating required dosages for animals. And charts related to textile production are analyzed and interpreted by students in the textile module.

Each module also contains copies of student handouts for duplication, career information, and step-by-step outlines for teachers.

For additional information or to receive a copy of these modules, contact Johnny Wallace in the PACE office, extension 2247.



1991 Summer Institute Nearing Maximum Enrollment

As we went to press, 19 area teachers and counselors had submitted applications for 20 tuition-free spaces in this year's PACE Summer Institute, June 17-28. Anyone interested in attending this year's Institute should call the PACE office right away.

The Institute is an intensive two-week course which offers teachers and counselors the opportunity to learn more about technology careers, counseling and motivational strategies, and methods of encouraging females into non-traditional careers. Participants are able to learn from each other, share successful practices and visit area industries; all in a professional yet enjoyable format.

Because of increased interest in the Institute, guidelines for acceptance have now been developed, with priority given to presently employed teachers and counselors in junior high, middle and high schools in Anderson, Oconee and Pickens counties. Anyone interested in receiving additional information should call Donna Branham in the PACE office (646-8361, ext. 2107).

Thank You To Area Schools and District Offices

The PACE office, along with several area school districts and high schools, continues to receive numerous requests for information and assistance from secondary and postsecondary faculty and staff all over the nation. In the last three months alone, over 400 requests for information have been received from 32 states, Canada, and Australia as a result of staff participation in three national conferences. Since the beginning of the school year, visitors from several school districts in South Carolina, Maryland, Virginia, and Idaho have toured classes and talked with faculty, counselors, administration and district representatives in all three counties. All visitors were met with warmth and enthusiasm, and they all commented on how helpful and informative their visits were.

The PACE staff thanks all representatives of the schools and district offices who participated in site visits this year. We are grateful for your willingness to share your time and expertise with these visitors, and we certainly understand the planning and work necessary to arrange these visits.

As a result of the increasing number of requests for these site visits, the staff has begun limiting visits to once a month. A waiting list of visitors for next year is already filling up! We will do everything we can to keep these visits manageable and ensure that they are as unobtrusive as possible. Again, we thank everyone involved for your patience and cooperation and for your expertise in sharing the Tech Prep story in Anderson, Oconee and Pickens counties!

Dr. Karen Woodward Elected PACE Board Chairperson

Dr. Karen Callison Woodward, superintendent of Anderson School District Five, was elected as the new PACE Coordinating Board Chairperson at the April Board meeting. Her term will run from 1991 to 1993, and she replaces Roy Herron, superintendent of Anderson School District Three, whose term expires at the end of May. Mr. Herron, a popular and enthusiastic chairman, has been an extremely effective leader for the PACE Coordinating Board for the last two years.

A strong supporter of the Tech Prep initiative, Dr. Woodward calls Tech Prep "a program whose time has come. It can bridge the gap between education and the needs of industry."

Dr. Woodward's doctorate in curriculum and instruction and master's degree in administration and supervision are both from the University of Georgia. She began her career as an English teacher at T.L. Hanna High School, then went on to hold several administrative positions including superintendent of Union County Schools, which was the position she held before coming to Anderson District Five in 1988.

Dr. Karen Woodward, new PACE Coordinating Board Chairperson, presents a plaque in appreciation to Mr. Roy Herron, outgoing Chairman, at a luncheon following the April Board meeting.

Second Annual PT Competition Held

by Johnny Wallace

In the second annual Principles of Technology (PT) competition, held at McDuffie High School and Career Center on April 20, 1991, the student team from Pendleton High School took this year's Grand Prize. Second place went to McDuffie High School and Career Center, third to Walhalla High, fourth to Seneca High and fifth to South

Seneca High School PT team members (left to right) Louis Wadford, David James, Crystal Donald, Jason Chrrakan and Jerome Whitner prepare their lab experiment for competition.

South Florence High School PT team members (left to right) Brenda Lawhon, Wendy Peques, Mary Wiggins, Pete Parrish and Shaw DuBose discuss the lab experiment portion of the competition.

Florence High School. The five-member student teams competed in three major events: an individual written examination, a team laboratory experiment and a short oral presentation.

The written examination consisted of multiple choice questions in which students had to demonstrate their knowledge of PT. The team lab exercise was entitled Mechanical Stress: Its Cause and Effect. Students were asked to measure the effects of a pulling force by adding weights to a string and measuring the distance the spring stretched. In the oral presentation, students identified types of mechanical stress that technicians must consider when designing different structures and why mechanical stress had to be considered.

While the team scores were being totaled, students participated in a Gedanken physics lab. A "fun" lab, Gedanken physics requires a student team to demonstrate reasoning and problem-solving abilities in solving technical problems. The Gedanken physics award went to Walhalla High School.

Anyone interested in learning more about the PT competition can contact Lucky Voiselle at McDuffie High School and Career Center, Harriet Palmer at Pendleton High School, or Johnny Wallace at the PACE office (telephone 646-8361, ext. 2247)

Seniors Praise TAS Program

by Anita Turlington

Two McDuffie High School and Career Center seniors are proud members of the school's honor roll for the first time, and they attribute their success to Technical Advanced Study (TAS), a new component of McDuffie's Tech Prep (PREParation for TECHnologies) program.

Nikki Brown and April Burris, along with five other McDuffie students, become Tri-County Technical College students for several hours each day by taking occupational courses (in their case, Fashion Merchandising) to get a head start on post-secondary studies. The students qualified for the program by meeting specific academic and vocational standards at McDuffie.

Both agree that this experience is a good lesson in responsibility as well as a great educational opportunity. "I never made the honor roll in my life, and I made straight A's at McDuffie last nine weeks, and have also been maintaining A's and B's at Tri-County," said Nikki.

"We can get some college courses out of the way, and maybe we can graduate earlier," said April, who is also on the honor roll and plans to enter Tri-County Technical College full-time after graduation in May. "The classes are great—not all book work. There are class discussions and field trips."

Elaine Clark, academic advisor for Tri-County's Fashion Merchandising program, said students participate in internships at the Atlanta Apparel Mart and Gallant Belk in addition to classroom work. Both Nikki and April designed and modeled clothing in a fashion show that students in the program produced recently for the Anderson Arts Council.

"When April and Nikki started classes, I felt it was a learning experience for me as well as for them. I have been really pleased with their progress, their dependability and class attendance. The quality of their work has been college-level," Mrs. Clark said.

Coming to Tri-County was a good decision and has improved their study habits and awareness of the importance of education. April said, "It's a terrific program."

TECH PREP FACTS, FIGURES AND FORECASTS...

■ If the General Education Development (GED) testing program were administered as an exam for high school graduation, the cut-off score now being used would deny a high school diploma to approximately 30% of the graduating seniors (nationally).

(Pipho, Chris. "The Unbridled, Undebated National Test." Phi Delta Kappan, April 1991, p. 575.)

■ ...:Technical employees are, and will continue to be the most difficult to recruit...demand for them is expected to be so great that they will be able to name their own salaries and the conditions of their employment.

(Towers Perrin and the Hudson Institute, Workforce 2000: Competing in a Seller's Market: Is Corporate America Prepared? August 1990, p. 4.)

■ Research shows that in the U.S. roughly half of the differences in earnings can be attributed to learning in school and on the job...Earnings are a function of the skills people have and...poor basic skills limit individuals' choices and their potential for earning.

(Carnevale, Anthony P. et al., Workplace Basics: The Skills Employers Want. American Society for Training and Development and U.S. Department of Labor Employment and Training Administration, October 1988, p. 5.)

Career Education *Coordinating Board Members*

Superintendents

Dr. Karen Woodward, Anderson District 5 (Chairperson, Pace Coordinating Board)
James Brown, Oconee County
Dr. Roger Burnett, Anderson District 2
Dr. Reginald Christopher, Anderson District 1
Richard Gettys, Interim, Pickens County
Roy H. Herron, Anderson District 3
Dr. O. Wray Smith, Anderson District 4

Business/industry representatives

Tom Barron, Duke Power
Cathy Mills, J.C. Penney Corporation
Jerry Pendley, Milliken - Honea Path Plant
Jim Uzzell, Cannon Memorial Hospital
Sherry Watts, Cascade Corporation

Agency representatives

Jane S. Cahaly, Anderson County Business-Education Partnership
Dr. Don C. Garrison, Tri-County Technical College
Dr. Jay Smink, National Dropout Prevention Center at Clemson University
Dr. Jerry Kirkley, The Career Center

PACE staff

Diana Walter, executive director
Johnny Wallace, associate director/curriculum developer
Rick Murphy, counselor liaison
Anita Turlington, instructional specialist
Donna Branham, secretary

The PACE office is located on the Tri-County Technical College campus. Telephone numbers: (803) 646-8361 (main number), 225-2250 (Anderson County), 882-4412 (Oconee County), 859-7033 (Pickens County).

TECH PREP News
PACE
P. O. Box 587
Pendleton, SC 29670

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Appendix E
Excerpts from Student Handbook
Hillsboro Union High School

accounting • agricultural mechanics • architectural drafting • auto body repair • automotive service • aviation maintenance technology • business management • computer science • criminal justice • dental hygiene • dental laboratory technology • diesel service mechanic • dietetic technician • early childhood education • electronic engineering technology • electronic service technology • environmental technology • civil technology: production • graphic reproduction • horticulture • industrial illustration • interpreter training program • landscape technology • legal assistant • machine technology • media library assistant •

Hillsboro Union High School District

Portland Community College

TECH·PREP PROGRAM

STUDENT·GUIDE

Hillsboro High School
3285 SE Rood Bridge Road
Hillsboro, OR 97123
648-8561

Glencoe High School
2700 NW Glencoe Road
Hillsboro, OR 97124
640-8971

R.A. Brown Jr. High School
1505 SW 219th Street
Hillsboro, OR 97123
642-5656

Evergreen Jr. High School
550 Evergreen Road
Hillsboro, OR 97124
640-8900

J.B. Thomas Jr. High School
645 NE Lincoln Street
Hillsboro, OR 97124
640-8939

J.W. Poynter Jr. High School
1535 NE Grant Street
Hillsboro, OR 97124
640-3691

The information for the 2+2 Tech Prep Program Student Guide was prepared by the Hillsboro Union High School District, Portland Community College, and the Oregon Career Information System. The guide was produced by the Hillsboro Union High School District and the Portland Area Vocational Technical Education Consortium (PAVTEC).

For more information, contact:
Hillsboro Union High School District
(503) 640-4604
PAVTEC (503) 244-6111

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2+2 TECH PREP PROGRAMS OVERVIEW

During the last two years of high school, juniors and seniors may choose a major course of study in one of the *2+2 Tech Prep Programs.* These programs are linked to 2-year associate degree programs at Portland Community College.

Purpose:
To acquire a good foundation for an associate degree and to earn advanced college credits where possible.Benefits:
1. Reduced amount of course repetition during first year of college;
2. Savings of time and tuition costs;
3. Opportunities for acceleration and advanced studies in college programs.

Admissions:
Students may enroll in a *2+2 Tech Program* in their junior or senior year. A minimum G.P.A. is not required. Counselors can advise students regarding appropriate program and course selections.

Required Courses:
The required courses in a *2+2 Tech Prep Program* are the standard eleventh and twelfth grade courses needed for a high school diploma. These are the same for all *2+2 Tech Prep Programs.*

Recommended Courses:
The recommended courses provide a major focus of study for the *2+2 Prep Program.* Three different types of courses are recommended: 1)Math, 2)Science, and 3)Technical. These courses provide a foundation for the specialized courses which make up the 2-year associate degree program at the Community College.

During the senior year, students at Hilhi and Glencoe may apply for dual enrollment status. These students are permitted to take technical classes at Portland Community College that are not available at the high school.

Advanced Credit Option:
The *2+2 Tech Prep* high school courses highlighted by a plus sign (+) have been matched with similar courses at Portland Community College. Juniors and seniors who earn an A or B grade in these high school courses may apply for advanced college credits. The Portland Community College courses for which advanced credits can be earned are also listed on the following two pages.

Program Completion:
To successfully complete a tw ar Tech Prep program, a student must: 1) complete at least four of the recommended courses in the program; 2) earn a minimum number of advanced college credits, and 3) receive a high school diploma.

Two -Year Associate Degree Programs:
Two-year associate degree programs are higher education programs offered by community colleges. An associate of applied science (AAS) degree is designed to prepare the graduate for particular careers. See a Portland Community College advisor or counselor for more information regarding the AAS degree programs and requirements.

ADVANCED CREDITS FOR 2+2 PROGRAMS

Through 2+2 Programs, high school students are able to earn "advanced credits" from Portland Community College. This is done by taking high school courses which are equivalent to college courses and fulfilling the college's credit requirements.

General Procedures:

1. Complete high school equivalent course or courses (A or B grade usually required);
2. Take the final test or challenge test that may be required;
3. Complete a Portland Community College registration form listing the college courses and credit values;
4. Pay a $10 registration fee to Portland Community College. (This fee is paid only once a year for any number of the credits earned that year.)

Subject Category	High School Equivalent Courses	Portland Community College Advanced Credits
BUSINESS	Accounting 1	[illegible] Intro to Accounting - 3 Cr
	Intro to Keyboarding & Keyboarding Applications	BT 121AA Keyboarding - 3 Cr
	Computer Applications for Business	[illegible] 10-Key on Microcomputers - 1 Cr [illegible] Beginning Micro Word Processing - 1 Cr
DRAFTING	Architectural Drafting	ADT 3.212 Intro to Residential Plans - 2 Cr ADT 3.352 Intro to Lt. Commercial Plans - 2 Cr
	Drafting 1	[illegible] Technical Lettering - 2 Cr
	Drafting 2	DRF 6.112 Tech. Freehand Sketching - 2 Cr DRF 6116 Intro to Drafting - 2 Cr
	Drafting 3	[illegible] Industrial Drafting - 8 Cr
EARLY CHILDHOOD EDUCATION	Child Services	ECE 7.402 Intro to Childhood Education - 3 Cr
ELECTRONICS	Electronics 2	[illegible] Electronic Circuits/Devices - 4 Cr
	Electronics 3	EET Digital Systems 1 - 4 Cr
GRAPHICS	Intro to Graphics & Advanced Graphics	[illegible] Intro to Graphic Reproduction - 2 Cr [illegible] Litho Prep - 2 Cr [illegible] Camera/Darkroom - 2 Cr
	Essentials for Algebra	DEM 20 Basic Math - 4 Cr
MATH	Consumer Math	[illegible] Business Math - 4 Cr
	Algebra 1	PCM 60 Elementary Algebra (First Term) - 4 Cr PCM 65 Elementary Algebra (Second Term) - 4 Cr
	Algebra 2	[illegible] Intermediate Algebra - 4 Cr [illegible] - 4 Cr
	Applied Tech Math	MTH 111 College Algebra - 4 Cr MTH 112 Elementary Functions - 4 Cr
	Pre-Calculus	[illegible]
	Calculus	MTH 251 Calculus I - 4 Cr MTH 251 Calculus 2 - 4 Cr
MACHINE/WELDING	[illegible]	[illegible]
	Advanced Machine Welding Tech	WLD 3.301 & 3.303 Flux-cored/Gas Metal Arc Weld. - 4 Cr WLD 3.501 & 3.502 Basic Fabrication 2-8 Cr

2+2 TECH PREP ASSOCIATE DEGREE WORKSHEET

1. Identification Information

Year Graduating _____ Social Security Number _____ Student I.D. No. _____

Date _____ Grade Level _____ Date of Birth _____ High School Attending _____

Name: _____ Sex: ☐ Female ☐ Male

Last First MI

Home Address _____ City _____ State _____ Zip _____

2. Community College Plan

1. Associate of Applied Science (AAS) Program: _____
(Title)

2. Portland Community College Campus you wish to attend: _____
(Name of Campus)

3. Reason for choosing this 2+2 Tech Prep Associate Degree program: _____

3. 4-Year High School Program

1. Fill in the titles of all of the courses you are required to take in your four years of high school.

2. Fill in the recommended courses for grades 11 and 12 found in this guide for the 2+2 Tech Prep Associate Degree program you have chosen.

3. With the help of your counselor, choose and fill in the appropriate elective courses for grades 9 and 10.

Grade 9	Grade 10	Grade 11	Grade 12
Required	Required	Required	Required
Required	Required	Required	Required
Required	Required	Required	Required
Required	Required	Required	Required
Required	Elective	Elective	Elective
Required	Elective	Elective	Elective
Elective	Elective	Elective	Elective
Elective	Elective	Elective	Elective

SAMPLE REGISTRATION FORM
2+2 TECH PREP ASSOCIATE DEGREE

Year Graduating _____ Social Security Number _____ Student I.D. No. _____

Date _____ Grade Level _____ Date of Birth _____ High School Attending _____

Name: _____ Sex: ☐ Female ☐ Male
Last First MI

Home Address _____ City _____ State _____ Zip _____

Parent/Guardian's Name _____ Phone _____

2+2 Tech Prep Associate Degree Program: _____
(Please indicate program title)

Electives

GRADE 11		GRADE 12	
1st Semester	*2nd Semester*	*1st Semester*	*2nd Semester*
☐ _____	☐ _____	☐ _____	☐ _____
☐ _____	☐ _____	☐ _____	☐ _____
☐ _____	☐ _____	☐ _____	☐ _____
☐ _____	☐ _____	☐ _____	☐ _____

Check (√) Box if College Credit Available

If you have any disabilities or academic limitations which require special support services, please give a brief explanation of your special needs: _____

_____

_____

_____ _____
Student Signature Parent Signature

Complete and present this form to your high school counselor. Retain a copy for yourself.
The enrollment form should be reviewed and updated at least once a year until graduation from high school.

_____
Counselor Signature

ACCOUNTING (AAS) *Cascade - Rock Creek - Sylvania*

This two-year Associate of Applied Science degree program teaches principles of accounting and income management, law, and economics. It includes general office skills such as typing and business communications. It also includes training on business machines such as calculators and computers. See Accounting (PROG 157) in the Career Information System (CIS).

This program intends to prepare people to work as: ACCOUNTING ASSISTANTS/BOOKKEEPERS (CIS OCC 1616)ACCOUNTING AND STATISTICAL CLERKS (OCC 1619)

WORK AND WAGES:

People who work in accounting occupations keep records required for business management. Responsibilities generally include maintenance of accounts, recording financial data, and assisting in the preparation of reports and financial statements.

Salaries for bookkeepers vary widely by employer and level of responsibility, they average about $1,275/month. Wages for accounting and statistical clerks average about $1,750/month.

EMPLOYMENT OPPORTUNITIES:

There is a balance of applicants to openings for bookkeeping and accounting jobs. There is a steady demand for people who have bookkeeping and accounting skills. Turnover creates many entry-level openings as people gain experience and progress to higher-level accounting positions. Many employers prefer applicants who have training in computerized accounting.

ASSOCIATED OPPORTUNITIES:

With additional experience graduates of this program may become accountants and auditors.

2+2 TECH PREP ASSOCIATE DEGREE

HIGH SCHOOL

Grade 11		Grade 12	
SEMESTER 1		**SEMESTER 1**	
Required Course	***Cr***	***Required Course***	***Cr***
English	.5	English	.5
U.S. History	.5	Economics	.5
Personal Finance	.5	***Recommended Course***	***Cr***
Recommended Course	***Cr***	+Algebra 1	.5
Essentials for Alg.	.5	Accounting 2	.5
+Accounting 1	.5	+Computer Appl/Bus	.5
+Intro. Word Proc.	.5	Physical Science	.5
SEMESTER 2		**SEMESTER 2**	
Required Course	***Cr***	***Required Course***	***Cr***
English	.5	English	.5
U.S. History	.5	Social Studies	.5
Health	.5	***Recommended Course***	***Cr***
Recommended Course	***Cr***	+Algebra 1	.5
Essentials for Alg.	.5	Accounting 2	.5
+Accounting 1	.5	+Computer Appl/Bus	.5
+Word Proc. App.	.5	Physical Science	.5
TOTAL	**6.0**	**TOTAL**	**6.0**

+College Credit Available

COMMUNITY COLLEGE

Grade 13		Grade 14	
First Term		**Fourth Term**	
*BA 101 Intro/Business	4	*BA 206 Mgmt.Fundmls.	3
PCM 30Business Math	4	*BA 215 Bus.Cost Acctg.	3
BA 2.101Intro/Acctg	3	*BC 202Princ. Econ. -	3
BT 121AAKeyboarding I	3	Macroeconomics	3
*WR 121 English Comp.	3	General Education	6
Second Term		**Fifth Term**	
*BA 211 Princ/Acctg. I	3	*BA 213 Princ./Acctg.	3
*BA 226 Business Law	3	*BA 299 Spec. Studies:	
*BA 256 Income Tax	3	Acctg.Problems.	3
*BT 220 Bus.Mach./Calc.	3	*BC 203 Princ./Econ.:	
*WR 214 Bus. Comm.	3	Microeconomics	3
		Elective	3
Third Term		General Education	3
*BA 131 Comp. in Bus.	4		
*BA 209 Acctg. Appe.		**Sixth Term**	
(Microcomp.)	3	*BA 271 Analyzing Fin.	
*BA 212 Princ/Acctg.II	3	Statements	3
*BC 201 Princ/Econ.		*BA 222 Finance	3
(Intro.Inst.Phil.)	3	Elective	3
Elective	3	General Education	6

*College Transfer

HIGH SCHOOL ELECTIVES

Essentials for Algebra
36 weeks, 1.0 credit
Strengthen computational skills; review simple algebraic operations and a lab approach to study of measurement and informal geometry. Reading of tables, graphs, ratios, scale drawings, percents and estimation.

Accounting 1
36 weeks, 1.0 credit
Basic accounting principles and procedures - profit and loss; asset and cash management; payables and receivables, bookkeeping; tax preparation and payroll.

Intro. to Word Processing
18 weeks, .5 credit
Basic word processing; formatting; filing; editing; searching; printing, etc.; document creation.

Word Processing Applications
18 weeks, .5 credit
Advanced word processing for creating, editing, revising and producing a variety of documents to meet business standards.

Algebra 1
36 weeks, 1.0 credit
Stucture of math analytical relationships; fundamental operations with algebraic terms and exponents and equations.

Accounting 2
36 weeks, 1.0 credit
Advanced accounting principles and practices - simulated accounting operations; cost accounting; introductory automated accounting systems; 10-key touch skills.

Computer Applications for Bus.
36 weeks, 1.0 credit
Information processing and office communications; word processing; electronic spreadsheet; database management; data entry; electronic mail; machine transcription; electronic 10-key calculator and computerized payroll.

Physical Science
36 wks, 1.0 Credit
Practical understanding of some of the fundamentals of physics and chemistry - energy and the enviornment; chemical reactions; applications of motion, heat, light, sound and electricity; forces of nature; basic machines.

FIRST TERM COLLEGE COURSES

BA 101 Intro to Business
4 credits
Business environment; management; organization; marketing; finance; accounting and data processing.

BA 2.101 Intro to Accounting
3 credits
Double entry bookkeeping as related to service business; general ledger; worksheets; financial statements; payroll; petty cash and bank reconciliations.

BT 121AA Keyboarding I
3 credits
Touch system typing, the set up and typing of simple tables, letters and manuscripts. This is a self-paced course. Dvorak keyboard option is available.

PCM 30 Business Math
4 credits
Applications of arithmetic to a variety of problems found in the business field: simple and compound interest; payroll preparaton; promissory notes; depreciation; insurance and other topics.

WR 121 English Composition
3 credits
First course in the English Composition sequence. Development of expository writing skills typical of rhetorical structures found in the essay. Expository essay and reading skills appropriate to transfer institutions in Oregon.

Appendix F
Excerpts from Counselors'/Teachers' Manual
Cerritos College

2+2+2=$

THE $TART PROGRAM

$uccess Through ARTiculation

COUNSELORS/TEACHERS' MANUAL

Cerritos College
ABC Unified
Bellflower Unified
Downey Unified
Norwalk-La Mirada Unified
Los Angeles County ROP
Southeast ROP
California State University

CERRITOS COLLEGE
11110 East Alondra Blvd.
Norwalk, CA 90650

With: Revisions 7/2/90)

MODEL ARTICULATION PROJECT

(2+2+2)

VOCATIONAL EDUCATION ARTICULATION PROJECT

PARTICIPATING DISTRICTS

Cerritos College
ABC Unified School District
Bellflower Unified School District
Downey Unified School District
Norwalk-La Mirada Unified School District
Southeast Regional Occupational Program
Los Angeles County Regional Occupational Program
California State University

Project Director: Keith K. Adams **Assistant Project Director: Betsy Stewart**

Funding provided through a cooperative effort of the
California Community Colleges Chancellor's Office
and the
California State Department of Education

Funds for the Project are authorized by the Carl D. Perkins Vocational Education Act of 1984
(P.L. 98-524)

(With Revisions 7/2/90)
TITLE

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FOREWORD

Cerritos College participated in a Phase III Articulation Project grant from the California Community Colleges Chancellor's Office and the State Department of Education to institutionalize an articulation model for high technology education and training programs.

The College has entered into an Articulation Consortium with four unified school districts and the California State University at Los Angeles. The Consortium includes 11 high schools, four continuation high schools, four adult schools, two regional occupational programs, Cerritos College, and California State University at Los Angeles. Thus a 2+2+2 program has been created--two years of high school study, two years of community college study, and the last two years of study at the university level.

An Articulation Council was formed (see next page) consisting of high level administrators from each district who, in turn, appointed members to five working subcommittees: English/ESL, Science and Math, Fine Arts, Counseling and Guidance, and Vocational Education.

The "high technology" education curriculums consist of automotive technologies, drafting and design (CAD/CAM), electronics, and manufacturing. These are part of the transfer curriculums of Industrial Technology and Industrial Education.

Actual articulation agreements with the high schools/adult schools/ROPs/continuation schools have been worked out in the above four areas, and, additionally, in auto collision repair, machine tool, and in the Business Education area: accounting, office occupations, data processing, and secretarial science.

One of the products of the Phase III project is this **Counselors/Teachers' Manual.** A complete set of working papers has been provided for each articulated program. This Manual will be widely distributed to counselors, teachers, administrators, and staff and, hopefully, will provide a model from which to work. Materials included in each section provide for both the general and unique requirements of each program and will assist in the articulation process.

We commend the efforts of all the high school/ROP/continuation school/and Cerritos College instructors who shared ideas, made suggestions, and prepared materials.

Keith K. Adams, Project Director
Betsy Stewart, Assistant Project Director

1/15/89
foreword.man

CHECKLIST FOR SECONDARY-LEVEL TEACHERS

The articulation of courses between the high schools/ROPs/Adult Schools and Cerritos College is based on the premise that it is the classroom teacher and their counselor colleagues who are most influential in encouraging students to continue their education. Articulation can only work with the instructors, counselors, and students working together.

When presented at the time of enrollment, the "Articulation Certificate" allows a Cerritos College counselor to grant the student advanced placement, allowing him or her to bypass the articulated lower level course.

If the student desires, he or she may receive college credit for the competencies learned at the secondary level by utilizing the College's Credit by Articulation/Examination* procedure specific to each articulated course. If the course is a transferable articulated class, these units of credit will transfer all the way to the University and the student will never have to duplicate the competencies. (Note: The student does not have to major in the articulated subject area or even enroll in an advanced class in order to utilize the credit by examination option.)

☐ 1. Each instructor teaching an articulated class will be requested to have all students in the class fill out a very brief "Statement of Participation" Form (see Appendix 3) at the end of each semester to provide statistical information for the statewide project. Give the filled-out form to the designated Articulation/Transfer Counselor (see "Contact Persons" section of this notebook).

☐ 2. In addition, each instructor teaching an articulated class is requested to fill out the "Articulation Certificate" Form (see Appendix 2, Form CG-12) for all junior and senior students completing the class with an A or a B, whether or not they are going to be attending Cerritos College.

☐ 3. Forward all copies of the "Articulation Certificate" Form to the designated articulation/transfer counselor at your site.

☐ 4. Inform students that their counselor will give them the "student copy" of the Form to take to Cerritos College and that their counselor will give them further instructions (see secondary-level Counselor Checklist).

☐ 5. Encourage students to follow through by making an appointment with a Cerritos College counselor when it comes time for them to enroll in College.

*NOTE: Credit by articulation/examination does not necessarily involve a written examination. It is a demonstration of proficiency. It could be a portfolio, an oral interview, a demonstration project, a modified final examination, etc. depending on each individual department involved with the articulated classes.

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insttchr.man

CHECKLIST FOR THE SECONDARY-LEVEL TRANSFER/ARTICULATION COUNSELOR

☐ 1. Provide students with information explaining the articulated programs between your high school/ROP/adult school and Cerritos College. This should include an example of the "Articulation Certificate" and a "Statement of Participation" and an explanation that the student must enroll at Cerritos College WITHIN TWO YEARS of completing the articulated coursework.

☐ 2. Provide your counselor colleagues with a list of articulated courses containing your courses and the corresponding Cerritos College courses. This will act as a reference source for your students and their parents.

☐ 3. Provide your teachers with "Statement of Participation" Forms to be completed before each mid-semester and sent to Cerritos College.*

☐ 4. Provide your teachers with any updated information concerning the articulated programs, including enough forms (Articulation Certificates) to be completed by teachers at the end of each semester for every student completing the articulated course with an A or B.

☐ 5. Have the teachers return all copies of the "Articulation Certificate" and "Statement of Participation" forms to you.*

☐ 6. Obtain signature of Principal or Assistant Principal on the "Articulation Certificate."

☐ 7. Give the student his or her copy of the Certificate (last copy). Keep your copy for the student's cumulative file. Mail remaining copies as stated in No. 10 below*.

☐ 8. Encourage students to follow through by making an appointment with a Cerritos College Counselor when it comes time for them to enroll. Emphasize the need to bring their copy of the Articulation Certificate.

☐ 9. Make a list of those students having completed articulated courses at your school site and keep for reference purposes.

☐ *10. ALL MATERIAL (SIGNED AND COMPLETED "ARTICULATION CERTIFICATES" AS WELL AS COMPLETED "STATEMENTS OF PARTICIPATION" SHOULD BE MAILED AS FOLLOWS:

Dr. Isabelle Egan
Articulation/Transfer Counselor
Cerritos College Counseling Office
11110 East Alondra Boulevard
Norwalk, CA 90650

NOTE: Emphasize to students that credit by articulation or examination does not necessarily involve a written examination. It is a demonstration of proficiency. It could be a portfolio, an oral interview, a demonstration project, a modified final examination, etc. depending on each individual department involved with the articulated classes.

10/13/89
hs-coun.chk

Appendix G
Copy of 1990 PACE Summer Institute

DEADLINE FOR ENROLLMENT IS MAY 15.

For more information, call:
Donna Branham
PACE secretary (Ext. 2107)
646-8361 882-4412
225-2250 859-7033

Application

To preregister, please complete this application and mail before May 15 to:
Donna Branham, PACE secretary
P.O. Box 587, Pendleton, SC 29670

Name _____
First Middle Last

Social Security Number _____

Title _____
(Include subject areas and grade levels, if teaching)

_____

School _____

School address _____

_____

Home address _____

_____

Home phone _____

What past participants are saying...

"Through the Institute, I became aware of new concepts in education and new possibilities for growth and development in my own life. Clearly, each instructor/ lecturer is committed to the challenge of reaching today's young people with every educational opportunity available. This is an experience I will never forget."

"The panel discussion by people in non-traditional careers was fascinating. It was inspiring to hear these people discuss their feelings and frustrations in overcoming obstacles on the way to reaching their goals."

"The 'Psychology of Winning' was extremely helpful to me in aspiring for a more satisfying personal life. I also plan to use these concepts in my teaching to aid students in becoming winners."

"The variety of topics and speakers extended my knowledge of career and educational opportunities. This Institute was very worthwhile as well as fun."

"During our visits to area industries, I have observed that employers have a great deal of information to share with students and are anxious to communicate with them directly."

PACE

P.O. Box 587
Pendleton, SC 29670

SUMM
INSTITU
·1·9·9

Information you can r
to help your students u
technology carec

June 18-2

PACI

Partnership for Acad
and Career Educat

Summer Institute: Technical and Industrial Career Opportunities for Women in the Tri-County Area

Offered by:
The Partnership for Academic and Career Education

June 18-29, 1990
8:30 a.m. - 2:30 p.m.
Tri-Cou... Technical College Campus

nderson, Oconee, and Picke... ounties are among the fastest growing ...eas in South Carolina. New businesse ...nd industries ing in our area, and changes in existing ıtries, have brought career opportunities that t exist just a few years ago.

a teacher or counselor, it's important that you r about careers available to your students and reparation they need to enter the workforce in new, more technical jobs. Because we recognize this information is not easily available, PACE's h annual SUMMER INSTITUTE offers you trips to local industries, demonstration tours, entations by business leaders and much more!

How will the SUMMER INSTITUTE help you?

The SUMMER INSTITUTE will help you obtain useful career information by:

- **increasing your awareness of technical and industrial career opportunities, especially for females, in the tri-county area**
- **increasing your knowledge about academic and t chnical preparation needed for entry into technology careers**
- **increasing your understanding of gender fairness in the curriculum, in textbooks and course materials, and in teaching strategies**
- **helping you develop strategies to assist students in improving their self-concept, encouraging goal-setting and self-discipline, and increasing motivation**

What will you study?

Through this intensive two-week course, you will learn about:

- **existing and emerging careers in technology**
- **the Tech Prep program**
- **making the high school curriculum more relevant to today's careers**
- **gender fairness in the curriculum**
- **building students' self-esteem, self-confidence, and motivation through the newly-revised Psychology of Winning series-- "Self-Esteem: The Transferable Skill."**

What will you do?

Your awareness of career opportunities in the technologies, and the skills needed for success, will be strengthened through such activities as:

- **field trips to local industries for first-hand observation of technical operations**
- **demonstration tours through technical labs of Tri-County Technical College**
- **presentations by business and industry leaders, technology teachers, and successful men and women in technical careers**
- **participation in the video series-- "Self-Esteem: The Transferable Skill--A Program for Educators," a program focusing on self-improvement and motivation**

What type of credit will you earn?

Upon completion of the Institute course, PSY 202-Psychology of Individual Achievement, you will be awarded 4.5 quarter hours (3 semester hours) of credit. Participants may apply to the State Department of Education for recertification credit in the following categories:

- **Specific Content/Methods (for individuals certified in psychology, social studies, and guidance)**
- **Nature of Teaching/Learning (for individuals certified in other areas)**

When and where will the SUMMER INSTITUTE be offered?

The Institute will meet June 18-29 (Monday through Friday), from 8:30 a.m. - 2:30 p.m., for a total of ten class periods. Classes will be held on the Tri-County Technical College campus.

You can participate tuition-free!

Through a Carl D. Perkins grant awarded to PACE by the State Department of Education's, Office of Vocational Education, tuition costs and instructional materials will be fully covered for 17 participants.

Who may attend?

Class size will be limited to 17 participants. In the event that the number of applicants exceeds the limit, first priority will be given to currently employed secondary counselors, teachers, and curriculum coordinators.

Appendix H
1990 North Carolina Tech Prep Conference Agenda

NORTH CAROLINA

Tech Prep CONFERENCE

AN EDUCATIONAL FOCUS FOR THE MAJORITY

September 20-21, 1990
Holiday Inn Four Seasons Town Centre
Greensboro, North Carolina

THURSDAY, SEPTEMBER 20, 1990

10:30 - **Registration** *(Convention Center Lobby)*

10:30 - 3:00 p.m. **Student Exhibits** *(Arcade and Convention Center Lobby)*
Scotland County Schools, Richmond County Schools, Moore County Schools

12:00 Noon **OPENING SESSION** *(Imperial Ballroom D)*
Mr. Joseph Grimsley, *Presiding*
Chairman - North Carolina Tech Prep Leadership Development Center Advisory Board

Welcome — Dr. Donald W. Cameron, *President - Guilford Technical Community College*
Dr. Mary Martin, *Associate Superintendent - Guilford County Schools*

Invocation

Tech Prep/Economic Development — Mr. Billy Ray Hall, *President - North Carolina Rural Economic Development Center Inc.*

Keynote Speaker — Mr. William C. Burkhardt, *President and Chief Executive Officer - Bahlsen Inc., Raleigh, N.C.*

1:30 - 1:45 p.m. **Break** *(Oak Room, 2nd Floor)*

1:45 - 2:45 p.m. **GENERAL SESSION** *(Imperial Ballroom EFGH)*
The Tech Prep Concept - Our Results to Date
Mr. Joseph Grimsley, *President - Richmond Community College*
Dr. M. Douglas James, *Superintendent - Richmond County Schools*
Mrs. Myrtle D. Stogner, *Director - North Carolina Tech Prep Leadership Development Center*

2:45 - 3:00 p.m. **Break** *(Oak Room, 2nd Floor)*

3:00 - 4:10 p.m. **GENERAL SESSION** *(Imperial Ballroom EFGH)*
North Carolina Showcase of Implementers
Mrs. Myrtle D. Stogner, *Moderator*

Asheville City Schools, Dr. Douglas Pearson, *Superintendent*
Anson County Schools, Mr. Bill Thacker, *Industry Education Coordinator*
New Bern/Craven County Schools, Dr. Bradford Sneeden, *Superintendent*
Eastern Guilford High School, Ms. Denese Smith, *Principal*
Guilford County Schools
Jackson County Schools, Ms. Dianne Cook, *Director of Vocational Education*
Montgomery County Schools, Dr. Don Herring, *Director of Vocational Education*
Moore County Schools, Dr. Gene Riddle, *Superintendent*
New Hanover County Schools, Mr. Richard Gemach, *Director of Vocational Education*
Pasquotank County Schools, Mr. Carlton Thornton, *Director of Vocational Education*
Rowan/Salisbury Schools, Dr. William L. Comer, *Director of Vocational Education*
Scotland County Schools, Mr. John Jones, *Superintendent*
Wayne County Schools, Mr. Bob Nethercutt, *Director of Vocational Education*
Wilson County Schools, Ms. Marilyn Moody, *Home Economics Teacher*

4:15 - 5:15 p.m.

The Leadership Role

A. Presidents/Superintendents — Dr. M. Douglas James, *Superintendent - Richmond County Schools* *(Oak A, B, & C)*
Mr. Joe Grimsley, *President - Richmond Community College*

B. Principals — Mr. Ralph Robertson, *Principal - Richmond Senior High School* *(Auditorium)*

C. College Deans/Vocational Directors/Directors of Instruction — Mrs. Myrtle D. Stogner, *Director - NC Tech Prep Leadership Development Center* *(Maple A, B, & C)*

D. Teachers/Guidance Personnel — Dr. Don Herring, *Director - Vocational Education, Montgomery County Schools* *(Cedar A & B)*

6:00 p.m. **RECEPTION** *(Wine and Cheese)* *(Arcade)*

7:00 p.m. **GENERAL SESSION** *(Imperial Ballroom EFGH)*
Dr. Gene A. Riddle, *Presiding*
Vice Chairman - North Carolina Tech Prep Leadership Development Center Advisory Board

Invocation

Introduction of Speakers — Mr. Larry Ives, *Superintendent - Montgomery County Schools*
Dr. Frank Eagles, *President - Wilson Technical Community College*

Keynote Speakers. — Mr. Bob Etheridge, *State Superintendent*
North Carolina Department of Public Instruction
Mr. Robert Scott, *President*
North Carolina Department of Community Colleges

9:00 p.m. **ADJOURN**

FRIDAY, SEPTEMBER 21, 1990

Breakfast	On Your Own	
8:30 - 11:45 a.m.	**CONCURRENT SESSIONS**	*(Participants May Select 3)*
8:30 - 9:20 a.m.	**FIRST CONCURRENT SESSION**	
A. Articulating the Public School/ Community College Curriculum for a 4 + 2 Program	Ms. Diane Honeycutt, *Vice President - Richmond Community College* Mr. Bob Nethercutt - *Wayne County Schools* Mr. Curtis Shivar, *Dean - Wayne Community College* Dr. Lundee Amos - *Guilford Technical Community College*	*(Imperial Ballroom A)*
B. Designing a Tech Prep Course of Study with Appropriate Staff Training	Mrs. Myrtle D. Stogner, *Center Director* Mr. Jim Seyzer, *Dean - Anson Community College*	*(Imperial Ballroom B)*
C. Applied Academics	Mr. Harold Gillis, *Director - Vocational Education, Hoke County Schools* Ms. Delia McNeill, *Math Instructor - Hoke County Schools* Mr. Jeff Moss, *Industry Education Coordinator - Hoke County Schools*	*(Imperial Ballroom C)*
D. Marketing Tech Prep	Mrs. Martha Webb, *Director - Vocational Education, Richmond County Schools* Mr. Robert Pearson - *Moore County Schools* Dr. Don Herring - *Montgomery County Schools* Mr. Ralph Robertson, *Principal - Richmond Senior High School*	*(Auditorium)*
E. Career Guidance	Dr. Trent Strickland, *Director - Federal Programs, Richmond County Schools* Mrs. Jean Davis, *Guidance Counselor - Rohanen Junior High School*	*(Cedar A & B)*
F. Monitoring for Results and Funding	Dr. M. Douglas James, *Superintendent - Richmond County Schools*	*(Oak A & B)*
9:30 - 10:20 a.m.	**SECOND CONCURRENT SESSION** *(Repeated)*	
10:00 a.m.	**Student Exhibits** Anson County, Moore County, Montgomery County, Eastern Guilford High School	*(Imperial Ballroom EFGH)*
10:20 - 10:50 a.m.	**Break**	*(Imperial Ballroom EFGH)*
10:50 - 11:40 a.m.	**THIRD CONCURRENT SESSION** *(Repeated)*	
12:00 Noon	**CLOSING GENERAL SESSION**	*(Imperial Ballroom D)*
	Dr. Sanford Shugart, *Presiding Vice-President of Programs - North Carolina Department of Community Colleges*	
Greetings	Dr. E. Wayne Trogdon, *Superintendent - Guilford County Schools*	
Invocation	Mr. Bruce Stanback, *Member - Richmond County Board of Education*	
Introduction of Speaker	Dr M. Douglas James, *Superintendent - Richmond County Schools*	
Keynote Speaker:	Mr. Howard Haworth, *Chairman Emeritus Member - North Carolina State Board of Education*	
Conference Wrap-Up	Dr. M. Douglas James	
2:00 p.m.	**CONFERENCE ADJOURNMENT**	

CONFERENCE PLANNING COMMITTEE

Mr. Joseph Grimsley Dr. M. Douglas James Mrs. Myrtle D. Stogner

STUDENT EXHIBITS COMMITTEE

Ms. Martha M. Webb, *Director of Vocational Education, Richmond County Schools*
Mr. John Stewart, *Director of Vocational Education, Scotland County Schools*
Mr. Robert Pearson, *Director of Vocational Education, Moore County Schools*
Dr. Don Herring, *Director of Vocational Education, Montgomery County Schools*
Mr. Ernest Witherspoon, *Director of Vocational Education, Anson County Schools*

ARRANGEMENTS COMMITTEE

Chairman, Mrs. Janice McDougald - *Secretary, Tech Prep Center*
Mrs. Pam Hinson - *Secretary, Richmond County Schools*
Mr. Osbert Haynes - *Director of Vocational Education, Greensboro City Schools*
Mr. Joe Miller - *Director of Vocational Education, Greensboro City Schools*
Mr. Bob Morrow - *Director of Vocational Education, Guilford County Schools*
Mrs. Hallie Myers - *Director of Vocational Education, Guilford County Schools*
Ms. Denese Smith - *Principal, Eastern Guilford High School, Guilford County Schools*
Mrs. Louise Witherspoon - *Secretary, Anson County Schools*

SPONSORED BY:

North Carolina Tech Prep Leadership Development Center
Funded by: North Carolina Department of Community Colleges
North Carolina Department of Public Instruction

Appendix I
Cerritos College Drafting Program Description

ARTICULATED PROGRAMS

DRAFTING AND DESIGN

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ABC UNIFIED SCHOOL DISTRICT

ACTIVE ARTICULATION AGREEMENTS

DRAFTING AND DESIGN

SUBJECT	SITE	ARTICULATES TO CERRITOS COLLEGE:
Architecture I	Artesia High School	ARCH 11-Architectural Drawing
Engineering II	Artesia High School	DRAF 31-Fundamentals of Drafting
Architecture I	Cerritos High School	ARCH 11-Architecture Drawing
Architecture II	Cerritos High School	ARCH 11-Architecture Drawing
Architecture III	Cerritos High School	ARCH 11-Architecture Drawing
Mech Drafting I	Gahr High School	DRAF 31-Fundamentals of Drafting
Mech Drafting II	Gahr High School	DRAF 31-Fundamentals of Drafting
Architecture I	Gahr High School	ARCH 11-Architectural Drawing
Architecture II	Gahr High School	ARCH 11-Architectural Drawing

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BELLFLOWER UNIFIED SCHOOL DISTRICT

ACTIVE ARTICULATION AGREEMENTS

DRAFTING AND DESIGN

SUBJECT	SITE	ARTICULATES TO CERRITOS COLLEGE:
Advanced Draft/CAD	Bellflower High School	DRAF 31-Fundamentals of Drafting
Drafting I	Mayfair High School	DRAF 31-Fundamentals of Drafting
Drafting II	Mayfair High School	ARCH 11-Architectural Drawing

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DOWNEY UNIFIED SCHOOL DISTRICT

ACTIVE ARTICULATION AGREEMENTS

DRAFTING AND DESIGN

SUBJECT	SITE	ARTICULATES TO CERRITOS COLLEGE:
Drafting II	Downey High School	DRAF 31-Fundamentals of Drafting

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NORWALK-LA MIRADA UNIFIED SCHOOL DISTRICT

ACTIVE ARTICULATION AGREEMENTS

DRAFTING AND DESIGN

SUBJECT	SITE	ARTICULATES TO CERRITOS COLLEGE:
Drafting 2	John Glenn High School	DRAF 31-Fundamentals of Drafting
Advanced Drafting	John Glenn High School	DRAF 31-Fundamentals of Drafting
Advanced Drafting	La Mirada High (ROP)	DRAF 53-Machine Draw and Design
Advanced Drafting	La Mirada High (ROP)	DRAF 57-Engineering Fundamentals
Drafting I	La Mirada High (ROP)	DRAF 31-Fundamentals of Drafting
Drafting II	La Mirada High (ROP)	DRAF 32-Mechanical Drawing

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VALLEY CHRISTIAN HIGH SCHOOL

ACTIVE ARTICULATION AGREEMENTS

DRAFTING AND DESIGN

SUBJECT	SITE	ARTICULATES TO CERRITOS COLLEGE:
Drafting I	Valley Christian High School	DRAF 31-Fundamentals of Drafting

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CERRITOS COLLEGE
DRAFTING AND DESIGN
ACTIVE ARTICULATION AGREEMENTS
WITH CALIFORNIA STATE UNIVERSITY LOS ANGELES

The following Cerritos College Drafting and Design courses transfer to California State University Los Angeles. NOTE: The class(es) with asterisk(s) indicate the possibility of high school/ROP units of credit transferring to California State University Los Angeles by way of the Cerritos College Articulation Process.

CERRITOS COLLEGE COURSES:		ARTICULATE WITH CAL STATE LA COURSES:
*Draf 32	Fundamentals of Drafting	Tech 110 Introduction to Drafting
Draf 33	Sheet Metal Layout	Tech 261 Sheet Metal Layout
Draf 36	Electro-Mechanical Design & Packaging	Elective
Draf 37	Graphical Statistics & Strength of Materials	Elective
Draf 38	Computer Aided Design	Tech 490D Computer Aided Design
Draf 50	Technical Illustration	Tech 312 Technical Illustration
*Draf 53	Mechanical Drawing and Design	Tech 412 Manufacturing Constr. Draft.
*Draf 57	Tool Engineering Fundamentals	Tech 411 Tool Design
Draf 58	Advanced Tool Engineering	Elective

As of September, 1988
csuladra.art

CERRITOS COLLEGE

ARCHITECTURAL TECHNOLOGY

Associate in Arts Degree Program

	REQUIRED COURSES	UNITS
ARCH 10	Architectural Orientatin	2
ARCH 11	Architectural Drawing	3
TM 1.2	Technical Math	3
ART 10	Freehand Drawing	3
ARCH 12	History of Architecture	3
ARCH 20	Building Codes, Materials and Equipment	3
ARCH 21	Architectural Drawing	3
ARCH 30	Architectural Delineation	2
ARCH 31	Architectural Drawing and Planning	3
ARCH 32	Basic Design	3
ARCH 41	Architectural Drawing and Planning	3
ARCH 42	Design and Structure	3
DRAF 38	Fundamentals of Computer Aided Drafting	3
	Total	37

ASSOCIATE IN ARTS DEGREE REQUIREMENTS:
Complete 64 units to include (1) the above course requirements, (2) the A.A. Degree general education requirements, and (3) electives as needed.

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CERRITOS COLLEGE

ARCHITECTURE

Transfer Program

COMMON LOWER DIVISION PREPARATION FOR THE CALIFORNIA STATE UNIVERSITY

	REQUIRED COURSES	UNITS
ARCH 10	Architectural Orientation	2
ARCH 11	Architectural Drawing	3
ARCH 12	History of Architecture	3
ARCH 21	Architectural Drawing	3
ARCH 30	Architectural Delineation	2
ARCH 32	Basic Design	3
ARCH 42	Design and Structure	3
MATH 21	Trigonometry	3
MATH 5.1	Pre Calculus Math	4
ECON 1.2	Principles	3

ADDITIONAL LOWER DIVISION REQUIREMENTS FOR SPECIFIC TRANSFER INSTITUTIONS

California Polytechnic State University-San Luis Obispo

MATH 5.2	Analytic Geometry and Calculus I	4
MATH 5.3	Analytic Geometry and Calculus II	4
PHYS 4.1	Engineering Physics	4
PHYS 4.3	Engineering Physics	4

California State Polytechnic University-Pomona

PHYS 2.1	General Physics and Laboratory	4
ENGL 2	Freshman Composition and Literature	3

NOTE: The undergraduate programs in architecture are impacted programs. Besides meeting entrance requirements to the state university, prospective students are required to also make separate application to the School of Architecture. Applicants are evaluated through a selection process carried out by departmental faculty.

ASSOCIATES IN ARTS DEGREE REQUIREMENTS:
Complete 64 units to include (1) the above required courses, (2) electives as needed, and (3) the Associate in Arts Degree in General Education requirements.

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CERRITOS COLLEGE

DRAFTING TECHNOLOGY PROGRAMS

Certificate of Achievement

REQUIRED CORE COURSES		UNITS
DRAF 32	Mechanical Drawing	3
DRAF 33	Sheet Metal Layout	2
DRAF 37	Graphical Statics & Strength of Materials	3
ENGR 23	Descriptive Geometry	3
TM 1.2	Technical Mathematics	3
or MATH 23	Intermediate Algebra	(4)
TM 2	Technical Mathematics	3
or MATH 21	Trigonometry	(3)
		17 (18)

ELECTRO-MECHANICAL DESIGN OPTION		
DRAF 36	Electro-Mechanical Design & Packaging	3
DRAF 38	Fundamentals of Computer Aided Drafting	3
DRAF 53	Machine Drawing & Design	3
DRAF 50	Technical Illustration Fundamentals	2
EL 1	Basic Electronics	4
or EL 10	Principles of DC Electronics	(3)
and EL 10.1	DC Electronics Laboratory	(2)
IP 25	Manufacturing Processes	3
		35 (36)*

MECHANICAL DRAFTING OPTION		
DRAF 38	Fundamentals of Computer Aided Drafting	3
DRAF 50	Technical Illustration Fundamentals	2
DRAF 53	Machine Drawing & Design	3
DRAF 57	Tool Engineering Fundamentals	3
IP 25	Manufacturing Processes	3
MT 10	Fundamental Machine Tool Operation	5
MET 10	Metallurgy and Non-Metallic Materials	3
		39 (40)*

TOOL DESIGN OPTION		
DRAF 38	Fundamentals of Computer Aided Drafting	3
DRAF 53	Machine Drawing & Design	3
DRAF 57	Tool Engineering Fundamentals	3
DRAF 58	Tool Engineering	3
IP 25	Manufacturing Processes	3
MT 10	Fundamental Machine Tool Operation	5
MET 10	Metallurgy and Non-Metallic Materials	3
		40 (41)*

ASSOCIATE IN ARTS DEGREE REQUIREMENTS:
Meet the above requirements as listed for the Certificate of Achievement in Tool Design. A student must also complete DRAF 36, DRAF 50, IA 10, electives and A.A. Degree general education requirements to achieve a minimum of 64 units.

* plus core
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elecmech.man

CERRITOS COLLEGE
COURSE COMPETENCIES

ARCHITECTURAL DRAWING
(ARCH 11) (3 UNITS)

The student coming to Cerritos College from the secondary-level articulated drafting/architecture program who elects to petition Cerritos College for credit by articulaton/examination for Architecture 11 must be able to perform 80% of the following with 100% accuracy:

The student will be able to:

1. properly utilize drafting instruments;
2. perform arcitectural lettering;
3. perform architectural linework;
4. prepare a sheet of architectural symbols;
5. recognize legends for different materials;
6. properly utilize press-on letters and symbols;
7. design a title block for a set of drawings;
8. prepare three views of a small tool;
9. solve for the orthographic projection of a roof plan;
10. prepare a plan, front elevation and right-side elevation of a small building;
11. prepare an isometric drawing of a small tool;
12. prepare an isometric drawing of a gable roof;
13. prepare an isometric drawing of a small building;
14. prepare the first floor plan sheet;
15. prepare the second floor plan sheet;
16. prepare an elevation sheet;
17. prepare a section sheet;
18. prepare a foundation plan;
19. prepare a plot plan;
20. prepare a roof plan.

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archl1.com

CERRITOS COLLEGE
COURSE COMPETENCIES

FUNDAMENTALS OF DRAFTING
(DRAF 31) (2 UNITS)

The student coming to Cerritos College from the secondary-level drafting program who elects to petition Cerritos College for credit by articulation/examination for Drafting 31 must be able to perform 80% of the following with 100% accuracy.

The student will be able to:

1. construct parallel and perpendicular lines;
2. construct circles;
3. construct tangents and various arcs;
4. construct regular polygons;
5. construct ellipses;
6. construct orthographic projection views;
7. dimension views appropriately;
8. visualize an object from orthographic projection views;
9. identify the best orthographic views of an object;
10. plan and space orthographic projection views;
11. construction a primary auxiliary view;
12. explain the reference plane and how it is used;
13. dimension auxiliary views appropriately;
14. solve the true length of a line;
15. construct a sectional auxiliary view;
16. construct section views consistent with conventions;
17. construct full, half, partial, revolved and removed sections;
18. plan section views;
19. dimension sectional views appropriately;
20. explain the use of various section conventions;
21. make basic isometric drawings;
22. make freehand isometric drawings;
23. dimension isometric drawings appropriately;
24. make oblique drawings;
25. construct isometric and oblique circles.

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CERRITOS COLLEGE
COURSE COMPETENCIES

MECHANICAL DRAWING
(DRAF 32) (3 UNITS)

The student coming to Cerritos College from the secondary-level articulated drafting program who elects to petition Cerritos College for credit by articulation/examination for Drafting 32 must be able to perform 80% of the following with 100% accuracy.

The student will be able to:

1. demonstrate vertical and inclined lettering;
2. perform geometric construction;
3. make pictorial drawings both isometric and non-isometric;
4. make auxiliary views;
5. make all sectional views;
6. draw threads and fasteners;
7. properly apply dimensions

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CERRITOS COLLEGE
COURSE COMPETENCIES

MACHINE DRAWING AND DESIGN
(DRAF 53) (3 UNITS)

The student coming to Cerritos College from the secondary-level articulated drafting program who elects to petition Cerritos College for credit by articulation/examination for Drafting 53 must be able to perform 80% of the following with 100% accuracy.

The student will be able to:

1. identify weld symbols;
2. apply weld symbols to weld drawings;
3. select materials from raw stock catalogs;
4. make detail drawings, assembly drawings and layout drawings;
5. apply feature control frames properly to drawing per Y14.5M;
6. use geometric tolerancing symbols according to Y14.5M;
7. calculate dimensions using geometric tolerancing controls;
8. use standard charts to solve belt drive problems;
9. use standard charts to solve chain drive problems;
10. use standard charts to solve gear train problems;
11. calculate the various items necessary to design a gear;
12. layout and draw a gear;
13. layout a base diagram;
14. use the various motions in base diagrams;
15. draw the outline of disc cams;
16. draw the outline for a barrel cam;
17. draw a straight follower cam;
18. draw a roller follower cam;
19. draw a flat face follower cam;
20. draw a pivot follower cam;
21. plot the motion of mechanisms;
22. calculate by graphical methods the velocity of points on a mechanism;
23. use Computer Assisted Drafting system including Standard Libraries.

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draf53.com

CERRITOS COLLEGE
COURSE OUTLINE

TOOL ENGINEERING FUNDAMENTALS
(DRAF 57) (3 UNITS)

The student coming to Cerritos College from the secondary-level articulated drafting program who elects to petition Cerritos College for credit by articulation/examination for Drafting 57 must be able to perform 80% of the following with 100% accuracy.

The student will be able to:

1. identify the purpose of the engineering drawing in a narrative or list form as it relates to tool engineering practices;

2. format and draft an engineering drawing of a "production part model" at an entry-level industry standard;

3. develop a route sheet planning all operations for the production part model to industry standards;

4. explain how a cost estimate is made as it relates to planning and design;

5. select and incorporate standard components into a tool design that will produce the production part to industry standards;

6. identify and explain economic advantages of incorporating catalog items as they pertain to tool engineering practices;

7. list the design and fabrication advantages of using purchased items in a tool design;

8. adapt a given tool design drafting format into a tool design drawing;

9. explain the method of developing a bill of material;

10. list at least six standard general notes that apply to a tool design drawing;

11. explain the purpose of the tool function note;

12. incorporate the principles of tool design into a jig design using location of the production part as the first function of jig design;

13. select the proper jig bushings for the jig design as the second function for the drill jig design;

14. list at least five ways to locate a production part in a design;

15. integrate tool design dimensioning and tolerancing to tool designs;

16. select the proper clamps and arrangements for a tool design as the third function of jig and fixture design;

17. list or sketch as least five ways to utilize standard clamps into a tool design;

18. design by sketch a simple clamp for holding a production part;

19. incorporate the principles of an open "U" shape to the welded jig structure;

20. design into a drill jig the freedom to move on the base of the machine--the fourth function of a jig design;

21. explain when to use the closed or box-type jig;

22. list various materials suitable for jig structures;

23. design and calculate dimensions and tolerances for a plug gauge when given American gauge design standards at industry level;

24. perform calculations necessary for the design of an inspection fixture to inspect a part complete;

25. explain the uses of various gauges and gauging methods;

26. explain a preference for or against a career as a tool engineer.

CAREER OPPORTUNITIES

DRAFTING AND DESIGN

The Cerritos College **Drafting Technology Program** prepares the student for a variety of occupations including, but not limited to, the following career opportunities:

Electro-Mechanical Designer
Mechanical Drafter
Tool Designer
Draftsperson
Master Layout Person
Systems Draftsperson
Junior Designer
Tool Designer

Cerritos College Drafting and Design Technology offers extensive and superior programs in both the architectural and mechanical fields.

Career opportunities are offered for both entry level jobs and for re-training and upgrading. Salary levels are excellent for well trained persons and the variety of jobs is broad and exciting. Advancement within these fields is contingent on the quality and level of training a student pursues.

Computer Aided Drafting and Design (CAD) is part of both architectural and mechanical drafting programs. Concentrated training is offered and CAD is also part of all advanced classes. Computer Aided Manufacturing (CAM) is also available.

SELECTED CAREER PROFILE

Drafting Program

Career Profile
for a
Computer Assisted Drafter/Designer

I. POSITION DESCRIPTION AND OVERVIEW:

Computer assisted drafters use computers to draft layouts, drawings and designs. They review a design and confer with engineering staff to develop a final copy of the design. They load programs into the computer, retrieve, type commands, and transfer the design to a hard copy (a computer term for a copy on paper). Drafters are increasingly using computer-aided design (CAD) systems. Instead of sitting at drafting boards, drafters who use CAD systems sit at computer work stations and make drawings and designs on a cathode-ray-tube (CRT) screen and a photosensitive screen to trace or draw designs. These systems free drafters from much routine drafting work, permit many variations of a design to be easily prepared, and allow a design to be viewed from various angles and perspectives not usually available with more traditional drafting methods. This enables the drafter to do work better, faster, and more thorough. This work is precise and factual. Prior knowledge in a particular area of drafting such as an electronic or mechanical drafter is often required. Training is usually acquired through community college programs. This emerging occupation will be in demand as more firms invest in the equipment. Job opportunities are very good. The salary is higher for computer assisted drafters than it is for traditional drafters.

RELATED OCCUPATIONS

1. Electronic Drafters- differ because they draw wiring diagrams, schematics, and layout drawings used by electronics manufacturers. They earn higher salaries than most other drafters. There is a high demand for these type of drafters.

SKILLS NEEDED

1. Knowledge of drafting procedures.

2. Knowledge of computers.

3. Ability to visualize objects.

4. Ability to make sketches and use drawing equipment.

5. Ability to work neatly, accurately, and in an organized and efficient manner.

6. Ability to extract information from catalogs and reference materials.

II. MINIMUM JOB/ENTRY LEVEL REQUIREMENTS:

Employers require that the individual has received a High School Diploma or received a certificate indicating satisfactory completion of high school equivalency courses and exams. Most employers prefer persons with college training (AA Degree) in drafting. Knowledge of drafting fundamentals as well as some background in computer assisted drafting and design will help one to find a job. Competition for drafting jobs is fierce.

The individual must demonstrate the following personal traits:

1. Good attendance and work habits.
2. Should be neat and clean.
3. Should be able to follow directions, instructions, commands, and to take constructive criticism.
4. Ability to make arithmetic computations.
5. Ability to visualize spatial relationships of plane and solid objects.
6. Ability to recognize small differences in shapes and to check for details.
7. Ability to use hands and fingers in drawing and sketching.
8. Ability to match colors.
9. Ability to work well under the pressure of deadlines.
10. Ability to work neatly and in an organized manner.

III. EDUCATIONAL REQUIREMENTS

A. HIGH SCHOOL

While in high school one should take mathematics, science, and industrial arts courses (drafting, photography, drawing, and art). Also, one should become familiar with computers in high school. High School experience is helpful to make an easier transition into community college if you have a background in these subjects. Employers are looking for persons with skills beyond high school training.

B. BASIC CORE COURSES IN DRAFTING (17 UNITS)

In this occupation it is possible to obtain employment by knowing the fundamentals of drafting. One could be hired with basic qualifications and then get on the job training from their employer. However, most employers prefer at least an A.A. Degree. The following courses are recommended to get a good basic knowledge of drafting:

1. Drafting Technology Program Basic Core Courses:
   a. Mechanical Drawing
   b. Sheet Metal Layout
   c. Graphical Statics and Strengths of Materials
   d. Descriptive Geometry
   e. Technical Mathematics 1.2 or Intermediate Algebra
   f. Technical Mathematics (TM 2) or Trigonometry

C. TWO YEAR CERTIFICATE/DEGREE

To be hired as a computer assisted drafter, most employers prefer that you have some advanced training. An Associate of Arts Degree in Drafting Technology is preferred. Cerritos College offers a Certificate of Achievement or an Associate of Arts Degree in Drafting. The courses consist of the following:

1. Basic Core Requirements in section B (above)

2. Choose one of the below program options:

   a. Electro-Mechanical Design Option

      (1). Electro-Mechanical Design & Packaging
      (2). Fundamentals of Computer Aided Drafting
      (3). Machine Drawing and Design
      (4). Technical Illustration Fundamentals
      (5). Basic Electronics
      (6). Manufacturing Processes

   b. Mechanical Drafting Option

      (1). Fundamentals of Computer Aided Drafting
      (2). Technical Illustration Fundamentals
      (3). Machine Drawing and Design
      (4). Tool Engineering Fundamentals
      (5). Manufacturing Processes
      (6). Fundamental Machine Tool Operation
      (7). Metallurgy and Non-Metallic Materials

3. Completion of the requirements for a Certificate of Achievement or for the Associate of Arts Degree in Drafting Technology (see Cerritos College Catalog)

4. Cerritos College offers more than the fundamental course in computer assisted drafting. It would be wise to take the advanced classes as some of your elective courses. See the Cerritos College Catalog for A list of the available classes.

D. FOUR OR FIVE YEAR DEGREE

A Bachelor of Science Degree in Technology is not required to become a computer aided drafter. Most persons are hired with only two years of training. However, a Bachelors Degree is very helpful for advancement within all companies. California State Universities such as those in Los Angeles and Long Beach have excellent degree programs in technology. It would be wise to consider continuing your education and pursuing a Bachelors Degree in Technology. By enrolling in the transfer program at Cerritos College, one is able to complete the lower division requirements such as history, English, and various drafting courses while working toward transferring to a University and completing a Bachelors Degree.

IV. CAREER OPPORTUNITIES/ADVANCEMENTS

A. JOB OUTLOOK

Employment prospects for drafters are currently good. They are even better for those with skills in computer assisted drafting. Those with skills in CAD will do better in finding a good job. Statewide, there is a surplus of inexperienced drafters, but a continuous shortage of well qualified mechanical, electrical, and civil engineering drafters. As more firms shift to the more convenient use of CAD it will be vital to have experience in this area.

B. WAGES AND OTHER INFORMATION

Pay in this field varies with education, employment setting, and ones level of skill. At one level drafters may start around $1400 per month. Those who begin around $1700 to $2300 per month have more education or a specialty desired by the employer. Experienced drafters can earn up to $3700 per month. A drafter/designer may earn up to $4800 per month.

Approximately 53,000 drafters are expected to be employed in California by 1990.

With experience workers can move to positions as senior drafters, design drafter, and to managerial positions.

For more information contact:
Cerritos College Technology Division Office
11110 E. Alondra Blvd. Norwalk, CA 90650-9973
(213) 860-2451 ext. 238

SELECTED CAREER PROFILE

Drafting Program

Career Profile
for
Mechanical Drafter

I. POSITION DESCRIPTION AND OVERVIEW:

A Mechanical drafter makes sketches of mechanical devices, prepares scale drawings of machines and parts, and checks the dimensions of items to be used in construction and manufacturing. Drafting is associated principally with the field of civil, electrical, and mechanical engineering, and architecture. There are many specializations such as hydraulics, mining, electromechanics, marine structures etc. One also makes drawings that are pictorial using only a few standard symbols to show cross-sections and special details. The draftsperson does freehand drawing only when they make preliminary sketches.

RELATED OCCUPATIONS

1. Architectural drafters- prepare drawings and other detailed graphic presentations from calculations, sketches, criteria, and other engineering data. An architectural draftperson is part of a team that supports and works with an architect.

2. Computer assisted drafters- use computers to draft layouts, drawings and designs. They load programs into a computer, retrieve, type commands, and transfer the design to a hard copy (a computer term for a copy that is on paper). This emerging occupation will be in demand as more firms invest in the equipment. Job opportunities are very good.

3. Technical Illustrators- layout and draw charts, graphs, and figures. They make three dimensional drawings in pencil or ink of mechanical, structural, and electrical parts assemblies for reference works, text books, and technical manuals.

SKILLS NEEDED

1. Knowledge of drafting procedures.

2. Ability to visualize objects.

3. Ability to make sketches and use drawing equipment.

4. Ability to work neatly, accurately, and in an organized and efficient manner.

5. Ability to extract information from catalogs and reference materials.

II. MINIMUM JOB/ENTRY LEVEL REQUIREMENTS:

The individual must have received a High School Diploma or received a certificate indicating satisfactory completion of high school equivalency courses and exams. Employers also prefer that the individual has college training AA or Bachelors Degree) in drafting. Competition is fierce in drafting so advanced training will open more job oportunities.

The individual must demonstrate the following personal traits:

1. Good attendance and work habits.
2. Should be neat and clean.
3. Should be able to follow directions, instructions, commands, and to take constructive criticism.
4. Ability to make arithmetic computations.
5. Ability to visualize how three dimensional objects fit together.
6. Ability to recognize small differences in shapes and to check for details.
7. Ability to use hands and fingers in drawing and sketching.
8. Ability to work neatly and in an organized manner.
9. Ability to work well under the pressure of deadlines.

III. EDUCATIONAL REQUIREMENTS

A. HIGH SCHOOL

While in high school one should take math, science, and industrial arts courses (drafting, photography, art). High School experience is helpful to make an easier transition into community college if you have a background in these subjects. Employers are looking for persons with skills beyond high school training.

B. BASIC CORE COURSES IN DRAFTING (17 UNITS)

In this occupation it is possible to obtain employment by knowing the fundamentals of drafting. One could be hired with basic qualifications and then get on the job training from their employer. However, most employers prefer an Associate of Arts Degree in Drafting with an

emphasis in mechanical drafting. The following courses are recommended to get a good basic knowledge of drafting:

1. Drafting Technology Program Basic Core Courses:
   a. Mechanical Drawing
   b. Sheet Metal Layout
   c. Graphical Statics and Strengths of Materials
   d. Descriptive Geometry
   e. Technical Mathematics 1.2 or Intermediate Algebra
   f. Technical Mathematics (TM 2) or Trigonometry

C. TWO YEAR CERTIFICATE/DEGREE

To be hired as a mechanical drafter, most employers prefer that you have some advanced training. An Associate of Arts Degree in Drafting Technology (mechanical drafting) is preferred. Cerritos College offers a Certificate of Achievement or an Associate of Arts Degree in Drafting. The courses consist of the following:

1. Basic Core Requirements in section B (above)

2. Choose one of the below program options:

   a. Electro-Mechanical Design Option

      (1). Electro-Mechanical Design & Packaging
      (2). Fundamentals of Computer Aided Drafting
      (3). Machine Drawing and Design
      (4). Technical Illustration Fundamentals
      (5). Basic Electronics
      (6). Manufacturing Processes

   b. Mechanical Drafting Option

      (1). Fundamentals of Computer Aided Drafting
      (2). Technical Illustration Fundamentals
      (3). Machine Drawing and Design
      (4). Tool Engineering Fundamentals
      (5). Manufacturing Processes
      (6). Fundamental Machine Tool Operation
      (7). Metallurgy and Non-Metallic Materials

3. Completion of the requirements for a Certificate of Achievement or for the Associate of Arts Degree in Drafting Technology (see Cerritos College Catalog).

D. FOUR OR FIVE YEAR DEGREE

A Bachelor of Science Degree in Technology is not required to become a mechanical drafter. Most persons are hired with only two years of training and given additional on the job training. However, a Bachelors Degree is very helpful for advancement within all companies. California State Universities such as those in Los Angeles and Long Beach have excellent degree programs in technology. It would be wise to consider continuing your education and pursuing a Bachelors Degree in Technology. By enrolling in the transfer program at Cerritos College, one is able to complete the lower division requirements such as history, English, and various drafting courses while working toward transferring to a University and completing a Bachelors Degree.

IV. CAREER OPPORTUNITIES/ADVANCEMENTS

A. JOB OUTLOOK

Employment prospects for drafters are currently good. They are even better for those with skills in computer assisted drafting. Those with skills in CAD will do better in finding a good job. Those drafters with experience in the preparation of schematics and printed circuit board designs usually have better employment prospects. Statewide, there is a surplus of inexperienced drafters, but a continuous shortage of well qualified mechanical, electrical, and civil engineering drafters. Faster than average growth is forecast through 1990.

B. WAGES AND OTHER INFORMATION

Pay in this field varies with education, employment setting, and ones level of skill. At one level drafters may start around $1400 per month. Those who begin around $1700 to $2300 per month have more education or a specialty desired by the employer. Experienced drafters can earn up to $3700 per month. A drafter/designer may earn up to $4800 per month.

Approximately 53,000 drafters are expected to be employed in California by 1990.

With experience workers can move to positions as senior drafters, design drafter, and to managerial positions.

For more information contact:
Cerritos College Technology Division Office
11110 E. Alondra Blvd. Norwalk, CA 90650-9973
(213) 860-2451 ext. 238

SELECTED CAREER PROFILE

Drafting Program

Career Profile
for an
Architectural Drafter

I. POSITION DESCRIPTION AND OVERVIEW:

This position, under regular supervision, prepares drawings and other detailed graphic presentations from calculations, sketches, criteria, and other engineering data. They plan, lay out, and prepare drawings on CADD from basic data. They prepare "as built" drawings of existing structures from field sketches and measurements. They also complete details of major layout drawings in accordance with standard drafting practices and CADD procedures. In their work, they may need to make mathematical computations. An Architectural Draftperson is part of a team that supports and works with an architect. They usually work for an employer who specializes in commercial or industrial buildings, residences, apartments, hotels, schools, or hospitals. They show the artistic and structural features of new projects and of alteration work on old construction. They also prepare working drawings, including floor plans, elevations, sections and details, upon which the building is constructed.

RELATED OCCUPATIONS

1. Computer Assisted Drafters (CAD)- use computers to draft layouts, drawings and designs. They review a design and confer with engineering staff. They load programs into the computer, retrieve information, type commands, and transfer the design to a hard copy. They use a Cathode-ray-tube (CRT) screen and a photosensitive screen to trace or draw designs. This emerging occupation will be in demand as more firms invest in the equipment. Soon it will be mandatory to have some experience with CAD. Job opportunities are good. Salary is slightly higher that for other drafters.

2. Electronic Drafters- differ because they draw wiring diagrams, schematics, and layout drawings used by electronics manufacturers. Salaries are higher for these type of drafters. The demand is high for these type of workers. Rapid growth is expected through the 1980's.

SKILLS NEEDED

1. Workers must have a knowledge of drafting instruments, such as curves and protracters, compasses, t-squares, and ellipse guides.

2. Must have the ability to read blueprints.

3. Must have the ability to work well with inks, pencils, and pens.

4. Must have a knowledge of building codes, materials and equipment.

II. MINIMUM JOB\ENTRY LEVEL REQUIREMENTS:

Training beyond high school is required for a wider choice of jobs, better pay, and advancement opportunities. Two years of technical training will qualify one to become an Architectural Drafter. Cerritos College offers a two year certificate program in architectural technology.

The individual must demonstrate the following personal traits:

1. Good attendance and work habits.

2. Should be able to follow directions, instructions, commands, and to to take constructive criticism.

3. Ability to read blueprints and make arithmetic computations.

4. Be able to concentrate on work in open surroundings.

5. Should have good communication skills in both written and verbal forms.

6. Should be able to work in groups of various sizes.

7. Ability to use hands and fingers in drawing and sketching.

III. EDUCATIONAL REQUIREMENTS

A. HIGH SCHOOL

While in high school one should take art, drafting, sciences, and as many industrial arts courses as possible. Those students whose long range goal is to become a licensed architect should take algebra, geometry, and trigonometry.

B. TWO YEAR CERTIFICATE/DEGREE

To be hired as an architectural drafter, most employers require that you have some advanced technical training. An Associate of Arts Degree in Architectural Technology would qualify one to become an architectural drafter.

Cerritos College offers an excellent program leading to an AA Degree. The courses consist of the following:

1. Required Courses for an AA Degree (37 Units)

   a. Architectural Orientation
   b. Architectural Drawing (Arch 11)
   c. Technical Math
   d. Freehand Drawing
   e. History of Architecture
   f. Building Codes, Materials and Equipment
   g. Architectural Drawing (Arch 21)
   h. Architectural Delineation
   i. Architectural Drawing and Planning (Arch 31)
   j. Basic Design
   k. Architectural Drawing and Planning (Arch 41)
   l. Design and Structure
   m. Fundamentals of Computer Aided Drafting

2. Recommended Electives:

   a. Architectural Drawing Occupational Work Experience (Arch 73/74)
   b. Introductory Psychology (PSYC 1)
   c. Fundamentals of Business (BA 1)
   d. Real Estate Principles (BUSR 11)

3. The Associate of Arts Degree General Education Requirements (See Cerritos College Catalog)

4. Electives as needed

C. TRANSFER PROGRAM

If one is interested in obtaining a Bachelors Degree in Architecture, Cerritos College offers a transfer program designed for those whose ultimate goal is to become a licensed architect. This program will enable one to complete their lower division work at Cerritos College and then transfer to the university of their choice. See your college counselor or the Cerritos College Catalog for more details.

D. FOUR OR FIVE YEAR DEGREE

A bachelors degree is not required to become an architectural drafter. Most persons are hired with only two years of training. However, a bachelors degree is required to become a licensed architect. California State Universities such as Pomona and San Luis Obispo have excellent programs in architecture.

IV. CAREER OPPORTUNITIES/ADVANCEMENTS

A. JOB OUTLOOK

Employment outlook for architectural drafters is expected to be good through the 1980's and into the 1990's. Employment in this occupation is closely tied to fluctuations in the economy. The amount of jobs depends on how much building and construction is going on in the area. The best opportunities will be in the most rapidly expanding communities. Prospects will be best for those with training beyond high school. Increased knowledge and skill can lead to advancement into higher level positions such as working with architects and architectural engineers on design and development. One could also advance to supervisory responsibilities such as training employees, or planning and delegating their work.

B. WAGES AND OTHER INFORMATION

Starting wages for beginning drafters is usually around $7.00 per hour. Through experience and education, the salaries could reach $10.00 to $15.00 per hour for a Senior Draftsman.

Salary increases and bonuses vary from company to company. Most companies provide increases based on merit or performance. Bonuses and salary increases depend on the profitability of the company. Bonuses are given at the end of a successful project or at the end of the year.

Fringe benefits: most companies offer paid holidays and vacations, health benefits, social security and pension plans.

In order to advance, one must have talent, be dependable, be willing to take on responsibility, and have good communication skills.

For more information contact:
The Cerritos College Technology Division Office
11110 E. Alondra Blvd. Norwalk, CA 90650-9973
(213) 860-2451,ext. 238

Drafting Program

Career Profile
for a
Tool Designer

I. POSITION DESCRIPTION AND OVERVIEW

Tool designers prepare sketches of designs for cutting tools, jigs, special fixtures, and other devices used in mass production. Frequently they redesign existing tools to improve their efficiency. They also make drawings of tools and fixtures or supervise other workers who are making similar drawings. They are a key part of the manufacturing process. They may find a variety of working conditions. They spend a considerable amount of time at a drawing board or in manufacturing areas in the shop.

RELATED OCCUPATIONS

1. Mechanical design technicians- develop mechanical drawings from engineering sketches to be used for manufacturing a product.

2. Engineering specifications technicians- examine plans and drawings to determine material specifications. They also prepare a lists of materials specifying quality, size, strength and compare these specifications to company, government, or other requirements.

SKILLS NEEDED

1. Must be good with both your hands and your mind.

2. Ability to analyze sketches and drawings and to apply scientific principles to problems in the shop or laboratory, in either the design or manufacturing process.

3. Must have an aptitude for mathematics.

4. Ability to follow written instructions.

5. Ability to communicate both in writing and verbally.

II. MINIMUM JOB/ENTRY LEVEL REQUIREMENTS

Certificate and Associate in Arts Degree programs are designed to prepare one for an entry level position as a tool designer. Employers look for those who have formal training as well as experience.

The individual must demonstrate the following personal traits:

1. Good attendance and work habits.

2. A mechanical aptitude is essential.

3. Must be interested in machines and have the ability to carry out detailed work.

4. Must have patience, perseverance, resourcefulness, and integrity.

III. EDUCATIONAL REQUIREMENTS

A. HIGH SCHOOL

While in high school one should take as many industrial arts classes as possible. Drafting and mathematics classes will be very good high school experience for those who are going to enter a training program for tool design.

B. CERTIFICATE OF ACHIEVEMENT (40 UNITS)

1. Basic Core Courses

   a. Mechanical Drawing
   b. Sheet Metal Layout
   c. Graphical Statics & Strength of Materials
   d. Descriptive Geometry
   e. Technical Mathematics or Intermediate Algebra
   f. Technical Mathematics II or Trigonometry

2. Tool Design Option

   a. Fundamentals of Computer Aided Drafting
   b. Machine Drawing and Design
   c. Tool Engineering Fundamentals
   d. Tool Engineering
   e. Manufacturing Processes
   f. Fundamental Machine Tool Operation
   g. Metallurgy and Non-Metallic Materials

C. ASSOCIATE IN ARTS DEGREE IN TOOL DESIGN

1. Complete the Above Requirements for the Certificate of Achievement in Tool Design

2. Complete the Following Courses:

   a. Electro-Mechannical Design and Packaging (Draf 36)
   b. Technical Illustration Fundamentals (Draf 50)
   c. Basic Electronics (IA 10)

3. Complete the A.A. Degree General Education Requirements to Achieve a Minimum of 64 Units

4. Recommended Electives

   a. Drafting Occupational Work Experience (Draf 74)
   b. Oral Communications for Technicians (Spv 18)
   c. Written Communications for Technicians (Spv 19)

D. FOUR OR FIVE YEAR DEGREE

A Bachelor's Degree is not required to become a tool designer. However, one may transfer to a university and enroll in the engineering program and become a tool design engineer. Tool design engineers are payed higher and will have more opportunities for advancement. California State University at Long Beach and California State University at Los Angeles both have excellent engineering programs. See your counselor for details.

IV. CAREER OPPORTUNITIES/ADVANCEMENTS

A. JOB OUTLOOK

Employment opportunities for tool designers are expected to be good in the future. New concepts of manufacture, new materials, new designs, new consumer demands -- all of these factors should provide more work for the well-trained tool designer. However, like most manufacturing jobs, opportunities will depend on economic conditions and the output of industry.

B. WAGES AND OTHER INFORMATION

The pay in this occupation depends on the amount of education and experience the person has attained. Tool designers make more than other technicians who usually make around $11.00 per hour. With higher qualifications and/or experience, workers can earn up to $20.00 per hour. Top earnings can exceed $25.00 per hour. Also, there is a lot of opportunity for overtime in this occupation.

For more information write The National Tooling and Machining Association, 9300 Livingston Rd. Ft. Washington, MD 20744 or contact

Cerritos College Technology Division Office
11110 E. Alondra Blvd. Norwalk, CA 90650-9973
(213) 860-2451, ext. 238

Appendix J
Chemeketa College Drafting Technology Competency Profile

Chemeketa Articulation Program
Drafting Technology
Competency Profile

Student: _____ Soc. Sec. No.: ___-___-____
Last First MI

School: _____ Instructor: _____

School Address: _____ Phone: _____

Student's Home Address: _____ Date of Birth: _____ Phone: _____

_____

HIGH SCHOOL DRAFTING COURSES

Course Title	Grade Level (9-12)	# Of Weeks	Date Completed	Grade Awarded
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

Duration of Employment	Job Title	Employer	Supervisor's Name	Address of Employer	Phone

ON-JOB TRAINING/WORK EXPERIENCE

Comments/Notes: _____

_____

_____

_____

MACHINE COMPUTER DRAFTING I

DRF-051 3 Credits

Student's Name _____ Grade _____

Chemeketa Textbook: *Technical Drawing*, Eighth Edition

DIRECTIONS: Check off each competency as the student completes them. Award a grade (A or B) when you sign the competency card

	COMPETENCY	HIGH SCHOOL COURSE WHERE COMPETENCY IS TAUGHT	TECHNICAL DRAWING REF. SEC.	PAGE
	A. BASIC SKILLS			
____	1. Letter with proper quality, shape and spacing within guidelines	_____	3.19	75
____	2. Produce uniform lines according to the alphabet of lines	_____	2.11	22
____	3. Draft with proper intersections, blends, and attention to other details	_____	2.47 5.25	4 146
____	4. Generate accurate drawings using decimal and metric measurements	_____	2.26, 2.30	30, 34
____	5. Layout projects in a balanced format	_____	6.7	161
____	6. Demonstrate proficiency in the use of modern drafting equipment	_____		
	B. SINGLE VIEW DRAWINGS			
____	1. Letter in vertical style	_____	3.17	73
____	2. Draft Title Block	_____		966
____	3. Center view in drawing space	_____	---	---
	C. MULTIVIEW PROJECTION			
____	1. Draft normal and inclined surfaces	_____	6.19-6.22	169-171
____	2. Utilize proper hole representation	_____	6.33	180
____	3. Dimension according to ANSI standards	_____	11.1-11.32	309-335
____	4. Produce isometric sketches	_____	5.12	135
____	5. Draft curved surfaces	_____	6.27-6.29	174-176
____	6. Develop curved intersections	_____	6.30	176
____	7. Demonstrate methods for transferring depth dimensions	_____	6.5	160
____	8. Determine view spacing	_____	6.7	161
	D. SPECIAL VIEWS			
____	1. Draft sectional views	_____	7	205-212
____	2. Dimension sectional views	_____	11	309-335
____	3. Draft full section view	_____	7.2	206
____	4. Generate half section view	_____	7.7	212
____	5. Dimension auxiliary views	_____	11	309-335
____	6. Draft a primary auxiliary view	_____	8.1-8.7	231-235

E. WELDING REPRESENTATION

____	1. Dimension a welding drawing	_____	11	309-335
____	2. Develop a material list	_____	25.1	711
____	3. Apply proper welding symbols	_____	25.5-25.7	716-718

F. PICTORIAL DRAWING

____	1. Draft isometric drawings	_____	16.5-16.16	513-519
____	2. Produce an oblique projection	_____	17.1-17.6	545-551
____	3. Draw a perspective	_____	18.1-18.4	561-565
____	4. Utilize proper drawing layout	_____	---	---

G. GEOMETRIC CONSTRUCTION

____	1. Generate geometric shapes	_____	4.21-4.31	98-103
____	2. Locate points of tangency	_____	4.35	104
____	3. Construct arcs	_____	4.36-4.41	104-107

_____

High School Instructor's Signature Date

_____

Student's Signature Date

_____

Chemeketa Drafting Program Coordinator's Signature Date

Comments: _____

_____

_____

_____

_____

BASIC ARCHITECTURAL DRAFTING COMPETENCIES

DRF-056 4 Credits

Student's Name _____ Grade _____

Chemeketa Textbook: *The Professional Practice of Architectural Working Drawings*

DIRECTIONS: Check off each competency as the student completes them. Award a grade (A or B) when you sign the competency car

	COMPETENCY	HIGH SCHOOL COURSE WHERE COMPETENCY IS TAUGHT	TEXTBOOK REFERENCE CHAPTER	PAGES
	A. FLOOR PLAN		8	
____	1. Perform Layout	_____		
____	2. Draft floor plan with proper wall thickness	_____		
____	3. Utilize door symbols	_____		
____	4. Utilize window symbols	_____		
____	5. Produce lettering in an architectural style	_____		
____	6. Draw cabinets and fixtures	_____		
____	7. Draw with proper line quality	_____		
	B. FOUNDATION PLAN		5 & 7	
____	1. Define soil bearing capacity	_____		
____	2. Describe types and categories	_____		
____	3. Specify insulation and ventilation	_____		
____	4. Draft floor structure	_____		
____	5. Apply dimensions in architectural style	_____		
	C. SECTION		10	
____	1. Describe theory	_____		
____	2. Utilize proper layout and cutting	_____		
____	3. Establish ground line	_____		
____	4. Draft structural system	_____		
____	5. Designate materials	_____		
____	6. Section foundation	_____		
____	7. Dimension vertical heights	_____		
	D. ELEVATIONS		11	
____	1. Plan projection	_____		
____	2. Window selection	_____		

	E. SITE PLAN		**6**
____	1. Property setbacks	_____	
____	2. Contours	_____	
____	3. Roof plan	_____	
	F. ELECTRICAL-HEATING		**173,174 304-306**
____	1. Symbols identification	_____	
____	2. Chose heating system	_____	
____	3. Place symbols on plan	_____	
	G. SPECIFICATIONS		**No Text**
____	1. Outline the building process	_____	
____	2. Contract documents and the bidding proceedure	_____	
____	3. Legal aspects	_____	

_____

High School Instructor's Signature — Date

_____

Student's Signature — Date

_____

Chemeketa Drafting Program Coordinator's Signature — Date

Comments: _____

_____

_____

_____

_____

INTRODUCTION TO COMPUTER DRAWING

DRF-072 3 Credits

Student's Name _____ Grade _____

Chemeketa Textbook: *Inside AutoCAD*

DIRECTIONS: Check off each competency as the student completes them. Award a grade (A or B) when you sign the competency card

	COMPETENCY	HIGH SCHOOL COURSE WHERE COMPETENCY IS TAUGHT	TEXTBOOK REFERENCE CHAPTER	PAGES
	A. BASIC			
____	1. Boot up computer	_____		
____	2. Demonstrate ability to save and recall drawings	_____	1	37
____	3. Utilize interactive input device	_____	1	4
____	4. Format and handle disk properly	_____		
____	5. Plot drawings on plotter	_____	8	
____	6. Utilize snap and grid	_____	2	4-8
____	7. Set up and change layers	_____	1	30-36
____	8. Key in locations based on absolute and relative coordinate measures	_____	1	14-20
____	9. Zoom and pan	_____	2	16-24
____	10. Object selection with window, crossing and object	_____	4	4-5

The students will demonstrate their ability to utilize the following commands in drafting applications.

	B. GRAPHICS PRIMITIVES			
____	1. Line	_____	3	1-8
____	2. Circle	_____	3	9-11
____	3. Arc	_____	3	12-14
____	4. Polygon	_____	3	27-28
____	5. Text and Dtext	_____	3	18-26
____	6. Pline	_____	3	15-17
	C. DRAWING CONSTRUCTION AND EDITING TECHNIQUES			
____	1. Offset, measure, and divide	_____	5	26-27
____	2. Fillet & Chamfer	_____	5	2-5
____	3. Hatch	_____	7	7-14
____	4. Extend, stretch and trim	_____	5	8-13
____	5. Move, copy	_____	4	5-11
____	6. Array, mirror	_____	4	11-15
____	7. Block	_____	6	1-4
____	8. Insert	_____	6	4-11
____	9. Break	_____	4	18-19
____	10. Change	_____	4	16-18
		_____		21-24

C. DRAWING CONSTRUCTION AND EDITING TECHNIQUES (Cont.)

____	11. Erase	_____	4	14-16
____	12. Explode	_____	6	11-12
____	13. Scale & rotate	_____	4	19-21
____	14. Pedit	_____	4	25-27

D. DIMENSIONING

____	1. Horizontal & vertical	_____	10	14-18
____	2. Angles	_____	10	23-24
____	3. Baseline and continue	_____	10	19-22
____	4. Diameter and radius	_____	10	8-13
____	5. Leader	_____	10	13-14
____	6. Dimvars	_____	10	6,16-20

_____

High School Instructor's Signature Date

_____

Student's Signature Date

_____

Chemeketa Drafting Program Coordinator's Signature Date

Comments: _____

_____

_____

_____

_____

Appendix K
Description of Richmond County Schools' Career Centers

RICHMOND COUNTY SCHOOLS'

CAREER CENTERS

RATIONALE

It has long been recognized that adequate career and educational counseling should be an important part of the secondary school experience for all students. However, the need for career and education counseling services is becoming even more acute as secondary school students prepare for an increasingly complex job market. The knowledge base is expanding rapidly and new jobs are requiring a higher level of education and expertise. Clearly, students must begin planning early during their secondary school experience and must be provided with adequate counseling services in order to make intelligent career decisions.

It is clear that more and more jobs in the future will require additional education past the high school level. Presently, less than 25 percent of the Richmond County Schools' graduates indicate an intent to pursue a four-year college degree. Moreover, 45-55 percent of Richmond County students pursue a general curriculum which is becoming inadequate for work and advanced training. The Tech Prep program which has been developed in cooperation with Richmond Community College attempts to provide a clearly defined curriculum, grades 9-12, that will lead students into post-secondary technical programs of study.

It is also expected that the Tech Prep program will help reduce the number of high school dropouts. Dropout statistics indicate that a large percentage of Richmond County school dropouts are enrolled in a general curriculum. Many of these students who drop out of school have no clear career and education related goals that might provide direction and meaning to their school experience.

In order to provide Richmond County school students with adequate career and education counseling, a new approach is needed for delivery of counseling services. Establishment of career centers in secondary schools will help to focus attention upon the need for career counseling and will provide the necessary information and counseling services that are needed to help students prepare for future careers.

DESCRIPTION OF HIGH SCHOOL CAREER CENTER

The Career Information Center (CIC) assists students in working through the complicated process of "choosing one's life work" and also serves as the "core" for the total services provided by the guidance department. The CIC offers career guidance and counseling services in the following areas:

- assessment of student interest, aptitudes and abilities
- information on educational opportunities
- information on careers
- job placement services
- additional career counseling for vocational and disadvantaged students

The CIC is a place at the high school where the emphasis is clearly placed upon career and education planning. It is a well-equipped and adequately staffed resource center that utilizes a variety of information, materials and services. A display area is maintained containing information on careers and educational opportunities. Included in the display area are numerous printed materials on occupations and educational institutions. In addition, information is available in non-printed forms such as filmstrips, video tapes and video discs.

A unique feature of the center is the use of computerized career guidance and information programs. Much career and educational information previously available only in printed form is now available that can assist students to assess their aptitudes and interests and learn more about occupations and post-secondary educational opportunities.

The Career Information Center at Richmond Senior High School contains six Apple IIe computers with printers and appropriate computer programs that allow students to work at the computers on an individual basis. After interacting with the computer, students meet individually or in groups with guidance counselors to discuss the information gained from the computer programs. The use of computers allows more students to receive career and education counseling services and frees counselors for more group counseling activities.

The CIC represents an expansion of career and education related guidance services. It incorporates and expands upon the educational planning services already being offered to students at the senior high school. The Center services all students; however, special effort has been made to provide career counseling services for the students enrolled in a general curriculum. The Tech Prep Program provides a viable alternative for students enrolled in general studies. It provides a clearly defined curriculum in grades 9-12 that leads students into post-secondary technical training.

Renovations at the high school were made to house the Career Information Center and were completed in the spring of 1987.

Specific Services Available at Senior High Career Information Center

The services that are available to students in the Career Information Center include the following:

Computerized Career Guidance Information System (GIS)

The GIS is a computer system that provides information on career exploration, two-year, four-year and graduate programs at U. S. colleges and universities, national scholarship programs and military careers. The GIS also includes the Career Decision-Making System which is a computerized version of the Harrington O'Shea Interest Inventory.

Testing

A testing program that includes interest inventories, aptitude tests and college admission tests (SAT, ACT, etc.) is available to students.

Career/Occupational References

Career information in printed and computerized form from the Occupational Outlook Handbook, Dictionary of Occupational Titles, Occupational Briefs, and Vocational Biographies is available.

Post-Secondary Education Information

Assistance is available that includes applications, catalogs, reference information on vocational and technical schools, two- and four-year colleges, universities and graduate programs. Extensive information and assistance are available concerning the Tech Prep related educational and career opportunities.

Educational Financial Aid

Information and applications are available for federal, state and local sources of public and private assistance.

Opportunities in the Military Service

Assistance is available concerning service academies, ROTC programs, enlistment and reserve opportunities.

Part-time Employment Opportunities

Part-time job placement services are available to students.

Workshops, Seminars, Interest Groups

The topics to be addressed in group workshops include the following: study and test-taking skills, problem-solving and decision-making skills, self-management and life planning skills, job-seeking skills and career planning.

Multi-Media Career and Educational Information

A variety of multi-media career and educational information are available. Examples include video tape programs on educational opportunities and a microfiche system for occupational explorations college search, college majors, apprenticeship programs and armed services programs.

Vocational Guidance Services

Additional vocational guidance services are available to vocational and disadvantaged students through the vocational department.

DESCRIPTION OF JUNIOR HIGH SCHOOL CAREER CENTERS

The junior high school career centers are similar to the center at the senior high school; however, since the career planning needs of junior high students are different than those of senior high students, the services offered to junior high students are not as broad and varied as those at the high school.

Computerized career guidance and information programs are placed in each of the four junior high schools. In addition, information on careers is available and emphasis is placed upon helping students to begin to assess their needs and interests and to begin making responsible decisions concerning high school programs of studies.

Appendix L
Richmond County Schools:
Career Planning Form

Gold Sheet - Student Copy
Other 3 copies to be filed
in Student Career Folder

Student Name _____
Homeroom Teacher _____
Homeroom No. _____

CAREER PLANNING FORM

To be completed in Spring of 8th grade prior to registration and updated annually. Must be returned in order to receive registration forms.

PROGRAMS: Select one Course of Study

Pre College _____

Gen./Voc. _____

Tech Prep _____
(Choose 1 of 3 Areas)
Engineering ___
Business ___
Health/Human ___

GENERAL REQUIRED COURSES:

Courses	Units
English	4
Mathematics	3
Science	2
Social Studies	2
Health & P.E.	1
Vocational Educ.	1
Electives	7
	20

9th Grade	10th Grade
English	English
Math	Math
Gov. & Eco.	Biology
Health & P.E.	
Elective	
Elective	

11th Grade	12th Grade
English	English
History	
Math	
Elective	
Elective	
Elective	

Alternatives:	(10th Grade)	(2nd Choice)	(3rd Choice)
10th			
11th			
12th			

A student must meet all grade level requirements, pass the Competency Exam and meet all state and local requirements for a minimum of 20 units in order to graduate.

Parent Signature _____
Student Signature _____

Appendix M
Chemeketa Community College List of Articulation Agreements

ARTICULATION AGREEMENTS
1990 - 1991

SCHOOL	ACCT	AG	DRAFT	ECE	ELECT	MFG	O/O	FOR
AMITY	X	X	X				X	
CASCADE	X		X				X	
CENTRAL	X						X	
DALLAS	X	X				X	X	
DAYTON	X		X				X	
DETROIT	X		X				X	
FALLS CITY	X						X	
Federal Prison*		X						
GERVAIS	X		X				X	
JEFFERSON	X	X		X		X	X	
J.F. KENNEDY	X		X				X	
MCKAY	X	X	X	X		X	X	
MCMINNVILLE	X						X	
MCNARY	X		X	X	X	X	X	
NEWBERG			X					X
NORTH MARION	X						X	
NORTH SALEM	X		X	X	X	X	X	
PERRYDALE	X						X	
SHERIDAN	X	X		X			X	
SILVERTON	X	X	X	X			X	
SOUTH SALEM	X		X	X		X	X	
SPRAGUE	X		X	X		X	X	
ST. PAUL	X	X					X	
STAYTON	X		X			X		
WILLAMINA	X						X	
WOODBURN	X		X	X	X		X	
YAMHILL-CARLTON	X						X	
	---	---	---	---	---	---	---	---
26 HIGH SCHOOLS	25	8	15	9	3	8	24	1

*Federal Prison Camp - Jude Lehner
Sheridan, Oregon
8.137 Plant Propagation

4/5/90
D 2

Appendix N
Excerpts from 1990 PAVTEC Course Articulation Reports

PAVTEC PROGRAM ARTICULATION
HILLSBORO HIGH SCHOOL
PRINCIPAL - PHIL BARNEKOFF

ADDRESS
3285 S. W. ROOD BRIDGE
HILLSBORO, OR 97123

PHONE
648-8561

SEPTEMBER 1990

PROGRAM	ARTICULATED PCC COURSES	PCC CREDITS AVAILABLE	HIGH SCHOOL EQUIVALENT COURSES	HIGH SCHOOL FACULTY	HIGH SCHOOL ADMINISTRATOR	PCC FACULTY	PCC ADMINISTRATOR	TEST SITE
AGRICULTURE	ANS 121	3	Agriculture 1, 2, 3 & 4	Terry Rueb	Al Miller	Don Hunter	Steve Rathman	HS
	ANS 201	4						
	ANS 202	4						
	ANS 203	4						
	ANS 204	4						
BUSINESS/OFFICE TECHNOLOGY	BA 2.101	3	Accounting 1	Ken Wolfe	Al Miller	Dolores Turville	Gaylon Huff	HS
	BT 2.172	1	Intro to Word Processing					
	BT 2.521	1	Auto Bus Lab					
	BT 121AA	3	Intro to Keyboard Apps					
DRAFTING	DRF 6.112	2	Basic Mech Drafting	Jerry Glines	Al Miller	Gary Reedy	Bob Dixon	HS
	DRF 6.114	2						
	DRF 6.116	8	Inter Mech Drafting					
	ADT 3.212	2	Architectural Drafting					
	ADT 3.352	2						
	DRF 6.202	8	Adv Drafting					
EARLY CHILDHOOD ED	ECE 9.423	3	Child Services	Dorothy Bright	Al Miller	Susan Sager	Sonya McDowell	H.
	ECE 7.471	2						
ELECTRONIC ENG.TECHNOLOG	EET 111	4	Electronics 1	Don Domes	Al Miller	Dave Hata	Bob Dixon	HS
	EET 112	4	Electronics 2					
MACHINE MANUF. TECHNOLOGY	MCH 3.210	15	Metals 1, 2, 3	Jerry Glines	Al Miller	Wally Thomas	Chuck Howell	HS
MATHEMATICS	See attached PCC and High School alignment			Bob Allnutt	Al Miller		Dick Clark	PCC
SOFTWARE ENGIN. TECHNOLOGY	CST 2.110	4	Pascal I & II	Dwight Johnson	Al Miller	Taylor Hanna	Bob Dixon	HS
WELDING	WLD 3.101	2-4	Metals 1, 2, 3	Jerry Glines	Al Miller	Harry Feldman	Gaylon Huff	PCC
	WLD 3.102	2 (partial)						
	WLD 3.103	2 (partial)						
	WLD 3.104	2 (partial)						
	WLD 3.105	2 (partial)						
	WLD 3.106	2 (partial)						
	WLD 3.301AA	2 (partial)						
	WLD 3.303AA	2 (partial)						
	WLD 3.501\	2-8						
	WLD 3.502/							

PAVTEC

COURSES ARTICULATED
September 1986 - September 1990
PORTLAND PUBLIC SCHOOLS

	Benson	Cleveland	Franklin	Grant	Jefferson	Lincoln	Madison	Marshall	Roosevelt	Wilson	Voc.Village	Greenhouse	Home Repair
AUTO BODY REPAIR	AB 3.102												
	AB 3.105AA												
	AB 3.106												
	AB 3.109												
	AB 3.131												
	AB 3.141												
AUTOMOTIVE SERVICE TECHNOLOGY	AM 3.401		AM 3.401	AM 3.401	AM 3.401			AM 3.401	AM 3.401		AM 3.401		
	AM 3.402		AM 3.402	AM 3.402	AM 3.402			AM 3.402	AM 3.402		AM 3.402		
	AM 3.404		AM 3.404	AM 3.404	AM 3.404			AM 3.404	AM 3.404		AM 3.404		
	AM 3.405		AM 3.405	AM 3.405	AM 3.405			AM 3.405	AM 3.405		AM 3.405		
	AM 3.408		AM 3.408	AM 3.408	AM 3.408			AM 3.408	AM 3.408		AM 3.408		
AVIATION MAIN. TECH.	AP 3.206												
BUILDING CONSTRUCTION	BCT 3.102AA		BCT 3.102AA		BCT 3.102AA								BCT 3.102
	BCT 3.106AB		BCT 3.106AB		BCT 3.106AB								
	BCT 3.125AA		BCT 3.125AA		BCT 3.125AA								BCT 3.125
	BCT 3.126		BCT 3.126		BCT 3.126								BCT 3.126
	BCT 3.129		BCT 3.129		BCT 3.129								
	BCT 3.115AB		BCT 3.115AB		BCT 3.115AB								
	ME 112		ME 112		ME 112								
	BCT 3.107AA		BCT 3.107AA										
	BCT 3.108		BCT 3.108										
	BCT 3.109AA		BCT 3.109AA										
BUSINESS/OFFICE TECHNOLOGY		BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101	BA 2.101		
		BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172	BT 2.172		
		BT 2.177		BT 2.177	BT 2.177		BT 2.177	BT 2.177	BT 2.177	BT 2.177			
			BT 2.521	BT 2.521	BT 2.521	BT 2.521	BT 2.521	BT 2.521	BT 2.521	BT 2.521			
		BT 111	BT 111										
		BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA	BT 121AA		
DIESEL SERVICE MECHANICS	DS 3.100												
	DS 3.101												
	DS 3.400												
	DS 3.502												
DRAFTING*	DRF 6.112	DRF 6.112	DRF 6.112	DRF 6.112			DRF 6.112	DRF 6.112	DRF 6.112	DRF 6.112			
	DRF 6.114	DRF 6.114	DRF 6.114	DRF 6.114			DRF 6.114	DRF 6.114	DRF 6.114	DRF 6.114			
	DRF 6.116	DRF 6.116	DRF 6.116	DRF 6.116			DRF 6.116	DRF 6.116	DRF 6.116	DRF 6.116			
	ADT 3.212	ADT 3.212	ADT 3.212	ADT 3.212			ADT 3.212	ADT 3.212	ADT 3.212	ADT 3.212			
	ADT 3.352												
	DRF 6.202												
EARLY CHILDHOOD EDUCATION		ECE 9.423	ECE 9.423	ECE 9.423						ECE 9.423	ECE 9.423		
		ECE 7.471	ECE 7.471	ECE 7.471						ECE 7.471	ECE 7.471		
ELECTRONIC ENGINEERING TECHNOLOGY	EET 111	EET 111	EET 111										
	EET 112	EET 112											
GRAPHIC REPRODUCTION	GRA 4.300									GRA 4.300	GRA 4.300		
	GRA 4.308									GRA 4.308	GRA 4.308		
	GRA 4.314									GRA 4.314	GRA 4.314		
INDUSTRIAL OCCUPATIONS	TE 9.121												
	TE 9.145												
	TE 9.237												
TRADE EXTENSION	TE 9.238												
	TE 9.242												
APPRENTICESHIP	TE 9.243												
LANDSCAPE TECHNOLOGY												LAT 8.105	
												LAT 8.106	
												LAT 8.109	
												LAT 8.111	
												LAT 8.242	
												LAT 8.244	
												LAT 8.280AA	
MACHINE MFG. TECHNOLOGY	MCH 3.210		MCH 3.210					MCH 3.210	MCH 3.210		MCH 3.210		
MATHEMATICS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		
MEDICAL TERMINOLOGY	MAT 9.405												
WELDING	WLD 3.101		WLD 3.101					WLD 3.101	WLD 3.101	WLD 3.101	WLD 3.101		
	WLD 3.102		WLD 3.102					WLD 3.102	WLD 3.102	WLD 3.102	WLD 3.102		
	WLD 3.103		WLD 3.103					WLD 3.103	WLD 3.103	WLD 3.103	WLD 3.103		
	WLD 3.104		WLD 3.104					WLD 3.104	WLD 3.104	WLD 3.104	WLD 3.104		
	WLD 3.105		WLD 3.105					WLD 3.105	WLD 3.105	WLD 3.105	WLD 3.105		
	WLD 3.106		WLD 3.106					WLD 3.106	WLD 3.106	WLD 3.106	WLD 3.106		
	WLD 3.301AA		WLD 3.301AA					WLD 3.301AA	WLD 3.301AA	WLD 3.301AA	WLD 3.301AA		
	WLD 3.303AA		WLD 3.303AA					WLD 3.303AA	WLD 3.303AA	WLD 3.303AA	WLD 3.303AA		
	WLD 3.501		WLD 3.501					WLD 3.501	WLD 3.501	WLD 3.501	WLD 3.501		
	WLD 3.502		WLD 3.502					WLD 3.502	WLD 3.502	WLD 3.502	WLD 3.502		

*The following drafting courses are offered at Benson High School to all drafting students in Portland Public Schools: ADT 3.352 and DRF 6.202

Appendix O
Richmond County School Board
"Report Card Fall 1989"

SIXTH: Here again, our students need total commitment from our Professional Staff, our Parents, and our Community in order for our young people to be motivated to see the positive values of being well educated. Beginning with a Personalized Kindergarten Program with Supplementary Parent Involvement, our teachers, principals, and administrators have developed numerous strategies and will work hard to improve student attitudes toward school and learning.

Primary educational motivation must begin in the home and also continue to be nurtured by the home environment.

"The home environment is a most powerful factor in determining the level of school achievement of students, student interest in school learning, and the number of years of schooling the children will receive." — Benjamin Bloom.

"Not every teacher is a parent, but every parent is a teacher. The most important thing a parent can give a child is the sense of the importance of education." — William Bennett, former U.S. Sec. of Ed.

We call upon all members of our civic, industrial, business, education, and church communities to join with the Richmond County schools in a concerted effort to raise the level of awareness and appreciation of our students and our citizens to today's compelling need for lifelong learning.

When Richmond County's first graders graduate in the year 2001, their educational achievement, their ability to earn a livelihood, and their effectiveness as citizens in a world community in the 21st century rest squarely upon our collective commitment to reach our goals for excellence in education.

A Publication of
The Richmond County Community Schools
BENJAMIN K. JONES, Ph.D., Coordinator

REPORT CARD
FALL 1989

Richmond County Schools'
SIX EDUCATIONAL GOALS FOR ECONOMIC GROWTH
(1986 - 1990)

- ★ **Improve Student Achievement in Basic Skills**
- ★ **Increase Average SAT Scores**
  Scholastic Aptitude Test Scores
- ★ **Decrease Dropout Rate**
- ★ **Increase Percentage of High School Graduates attending 4 Year/2 Year/ Trade and Technical Schools**
- ★ **Increase Technical Literacy of all students**
- ★ **Improve Student Attitudes toward school and learning**

Teaching - Learning
Touching Tomorrow Today

M. DOUG JAMES, ED.D, SUPERINTENDENT

RICHMOND COUNTY'S EDUCATIONAL GOALS FOR ECONOMIC GROWTH

Our Board of Education adopted six educational goals for economic growth in 1986. These goals are "results oriented" and are carefully reviewed by the administrative staff after each school year is completed. New strategies and methodologies are constantly being considered and implemented in order to achieve the desired objectives. In a number of instances, goal objectives have been adjusted upward because student achievement has exceeded original goals set for target date 1990.

We feel that having implemented our Six Educational Goals for Economic Growth three years ago is providing a framework within which all aspects of student needs and academic achievement can be addressed. We are confident that the attainment of these goals will prove beneficial for Richmond County youth as well as our Five Point Education Investment Plan and our Long Range Facility Plan for new construction and building renovations.

GOAL 1

IMPROVE STUDENT ACHIEVEMENT IN BASIC SKILLS

In the chart shown below, the reading, language and mathematics goals are given by grade equivalence. For example, the achievement in Reading for Grade 3 in 1989, was the level of Grade 3, eighth month. The figures under the year 1990 are the goals to be met.

READING TEST RESULTS

GRADE 3			GRADE 6			GRADE 8		
86	89	90	86	89	90	86	89	90
3.6	3.8	3.9	6.1	6.2	7.0	8.1	8.4	8.7

LANGUAGE TEST RESULTS

GRADE 3			GRADE 6			GRADE 8		
86	89	90	86	89	90	86	89	90
3.9	4.8	4.4	6.4	6.6	7.2	8.5	8.9	8.8

MATHEMATICS TEST RESULTS

GRADE 3			GRADE 6			GRADE 8		
86	89	90	86	89	90	86	89	90
3.8	4.4	4.3	6.8	6.9	7.3	8.2	8.9	8.9

SCIENCE GOALS

	GRADE 3		GOAL
	1986	1989	1990
Life Science	8	11	11
Physical Science	9	10	12
Earth-Space	9	10	11
Process	7	10	8
Lower Order *	10	11	12
Higher Order *	22	30	28
Percentile **	40	57	60

	GRADE 6		GOAL
	1986	1989	1990
Life Science	8	7	12
Physical Science	9	8	13
Earth Science	8	7	10
Nature of Science		6	
Process	4	7	5
Lower Order *	10	14	16
Higher Order *	18	21	22
Percentile **	42	41	65

	GRADE 8		GOAL
	1986	1989	1990
Life Science	4	8	6
Physical Science	7	7	9
Earth Science	7	7	8
Nature of Science		7	
Process	7	1	8
Lower Order *	10	11	11
Higher Order *	15	25	20
Percentile **	48	43	60

* Lower & Higher Orders = Levels of Difficulty

** Percentile = A measure (point) in a frequency distribution at or below which a given percentage of measures lie.

HIGH SCHOOL COMPETENCY TEST GOALS

READING

1986	1987	1988	1989	1990
92.8	93.0	92.3	91.2	96.0

WRITING

1986	1987	1988	1989	1990
84.0	85.0	83.9	89.5	88.0

MATHEMATICS

1986	1987	1988	1989	1990
90.0	91.0	89.4	89.5	94.0

NOTE Competency testing was moved from the eleventh to the tenth grade

WRITING

PERCENTAGE OF STUDENTS SCORING AT OR ABOVE THE MID-POINT OF THE 4 POINT SCALE

GRADE 6

	86-87	88-89	GAIN	GOAL 1990
Richmond County	28.5	51.9	23.4	60.0
North Carolina	28.5	49.8	21.3	
GAP		+2.1		

GRADE 8

	86-87	88-89	GAIN	GOAL 1990
Richmond County	51.8	67.9	16.1	60.0
North Carolina	37.7	55.0	17.3	
GAP	+14.1	+12.9		

GOAL 2

INCREASE SCHOLASTIC APTITUDE TEST SCORES

SAT RESULTS & GOAL

	VERBAL	MATH	TOTAL
1986	368	403	771
1987	392	403	795
1988	390	426	816
1989	397	422	819
1990	400	450	850

GOAL 3

DECREASE DROPOUT RATE

DROP OUT RATE: Grades 9-12

SCHOOL YEAR	PERCENTAGE DROPOUT RATE	CUMULATIVE DROPOUT RATE
1985-86	7.2	29.0%
1986-87	7.0	28.0%
1987-88	4.9	20.0%
1988-89	4.8	19.0%
1990 GOAL	Original 5.0%	Revised: 4.5%

DROP OUT RATE: Grades 7-12

SCHOOL YEAR	PERCENTAGE DROPOUT RATE	CUMULATIVE DROPOUT RATE
1985-86	7.2	28.8%
1987-88	3.9	23.4%
1988-89	3.8	23.0%

GOAL 4

INCREASE PERCENTAGE OF HIGH SCHOOL GRADUATES ATTENDING 4 YEAR • 2 YEAR • TRADE & TECHNICAL SCHOOLS

GRADUATE INTENTIONS RESULTS AND ORIGINAL GOAL

	1986	1987	1988	1989	1990
4 Year College	23.5%	23.0%	27.0%	34.0%	
Trade/Tech	24.6%	44.0%	46.0%	42.0%	
Military	12.2%	13.0%	14.0%	11.0%	
TOTAL	60.3%	80.0%	87.0%	87.0%	70.0%

GOAL 5

INCREASE TECHNICAL LITERACY OF ALL STUDENTS

PERCENTAGE ENROLLMENT BY PROGRAM OF STUDY

GRADES 10-12

Total enrollment: 2639 students

	Fall of 1986	Fall of 1989	Current Eleventh Grade
Pre-College	30.0%	31.3%	34.0%
Tech-Prep	0.0%	27.3%	30.0%
General/Vocational	70.0%	39.3%	36.0%

END OF COURSE TESTING

ALGEBRA I

	1986	1989
Number Tested	352	506
Percent of Class	47.1	73.0
Average Core	32.3	35.2
Percent Core	53.6	58.7

ALGEBRA II

	1987	1989
Number Tested	162	161
Percent of Class	22.7	23.0
Average Core	35.8	33.3
Percent Core	64.0	59.4

BIOLOGY

	1987	1989
Number Tested	618	550
Percent of Class	81.6	79.0
Average Core	37.2	38.0
Percent Core	56.3	57.6

NOTE: Number Tested is the number of students who took the Algebra I Test, Algebra II Test or Biology Test. Percent of Class is the total number of Algebra I, Algebra II, or Biology students divided by the number of students in the ninth grade class. It is an estimate of the percent of a cohort or class of students who will take Algebra I, Algebra II or Biology before leaving high school. Average Core is the average of the entire group while Percent Core is the expression of numerics in percentages.

GOAL 6

IMPROVE STUDENT ATTITUDES TOWARD SCHOOL & LEARNING

1988-1989	GRADE 4 NP	GRADE 4 LP	GRADE 7 NP	GRADE 7 LP
Motivation for Schooling	46	42	51	41
Academic Self Concept: Performance Based	46	45	51	48
Academic Self Concept: Reference Based	52	51	51	45
Sense of Control	40	46	43	44
Instructional Mastery	34	49	44	47

NP = National Percentile LP = Local Percentile

MAJOR FACILITY IMPROVEMENT PROJECTS 1986-1990

	TOTAL COST
New Construction and Renovations	$10.490.000
Roof Replacements	645.000
Asbestos Removal & Replacement	950.000
Air-Conditioning	2.850.000
Energy Conservation Measures	275.000
TOTAL:	**$15,210,000**

MAJOR BUILDING PROJECTS 1986-90

LIST SCHOOLS:

WASHINGTON STREET SCHOOL
Begin Date: Dec. 1988
Cost: $4.850.000
Completion Date: Dec. 1989

MONROE AVENUE
Begin Date: Jan. 1990
Cost: $2.259.000
Completion Date: Dec. 1990

ROHANEN JUNIOR
Begin Date: Jan. 1990
Cost: $2.255.000
Completion Date: Dec. 1990

ELLERBE JUNIOR
Begin Date: Jan. 1990
Cost: $1.156.000
Completion Date: Dec. 1990

AIR-CONDITIONING

CORDOVA
ELLERBE PRIMARY
HOFFMAN
ROHANEN PRIMARY
ROCKINGHAM JUNIOR
Begin Date: June 1989
Cost: $1.450.000
Completion Date: July 1990

ASHLEY CHAPEL
L.J. BELL
FAIRVIEW HEIGHTS
MINERAL SPRINGS
Begin Date: March 1990
Cost: $1.400.000
Completion Date: Aug. 1991

Summary

FIRST: We are continuing to implement new procedures in order to raise student achievement in the basic skills of communication, computation and problem solving. Longitudinal test data are being developed and, along with many other objectives, recommendations are being further studied and implemented from findings of the Math and Communications Study Committee's Report.

SECOND: We are increasing our Scholastic Aptitude Scores. Scholastic aspiration and student achievement are being promoted K-12 through utilization of specific procedures worked out and agreed upon by the entire administrative staff. Our scores have consistently risen since 1985 and reaching our goal of 850 by 1990 should place us well above state average.

THIRD: Our dropout rate continues to decrease from 7.2% of enrollment in 85-86 to 4.8% in 88-89. Our original goal of 5.0% for 1990 has now been lowered to 4.5%. We feel that a cooperative effort now underway by the schools, parents, and the community provides the answer to the dropout problem. Business Partnerships, Parent Involvement, Student Awareness, Community Support, and Dedicated Education Professionals are the essential ingredients.

FOURTH: The overall impact of Richmond County's Six Educational Goals for Economic Growth is vividly revealed in the marked increase of our students attending 4 Year/2 Year/Trade and Technical Schools. From 60.3% in 1986 (including Military), we have now reached 87% — a 27% increase which exceeds our original 1990 goal of 70% by 16%. Significant increases are shown in each category.

FIFTH: Technical literacy has become a "household word" since the inception of Richmond County's Tech Prep Program in 1986. Regional, state, and national discussions and goals highlight our Tech Prep Program as being "on target" in raising student's academic levels and in keeping pace with scientific and technological developments which are changing our community, our economic system, and our global relationships.

Appendix P
Ten Principles for Articulation Success

THE TEN PRINCIPLES OF ARTICULATION

1. *Leadership and Commitment*

Leadership from the very top of the organization is a key element necessary for the success of the articulation effort. Superintendents, principals, presidents, school boards, and trustees must take leadership for articulation and must organize and commit institutional resources toward that effort. Curriculum people and department chairs must also provide leadership to faculty.

2. *Early Faculty Involvement*

We must involve faculty members early. Their early involvement in developing articulation procedures and materials will help assure acceptance of the articulation effort. In order to insure a successful articulation program, as many faculty members as possible should be invited to participate in the meetings held for planning and curriculum development. This will help instructors from the different levels, high school, ROP/C, community college and the four-year institutions to get to know one another, understand each other, and respect one another. Meetings should rotate between facilities so that instructors can better understand the "other guy's" program.

3. *Respect and Trust*

Relationships need to be built on respect and trust. This usually takes time and is developed through the process of working together on common goals. Secondary and post-secondary instructors and administrators often have misconceptions about their colleagues at the other education level. In situations where an articulated program has instructors at one level certifying the competencies of their graduates, skepticism is removed and the student becomes the focus. Respect and trust are reinforced by regular communication and working together.

4. *Mutual Benefits To All Parties*

To be successful, the articulation effort must ensure that all parties benefit. Each school and college must clearly see the benefits to be derived. Unless both parties clearly understand how they will benefit, they will not be willing to commit the time and resources necessary for meaningful articulation.

- Articulation serves students best by saving them time and money because they don't have to duplicate courses.
- Articulation helps schools and colleges improve their curricula. Faculty and administration at both levels will see articulation as a good recruiting and public relations tool.

5. *Written Articulation Agreement*

Write it out! Put all agreements in writing. A formal written articulation agreement should be signed by the chief executive officer of the schools and colleges.

Most organizations having articulation agreements have them at two levels: at the institutional level and at the program level. Presidents and principals/superintendents usually sign at the institutional level and department heads sign at the program level. The agreements need to be publicized both within and outside the institutions.

6. *Open, Clear and Frequent Communication*

Talk to one another as often as possible. Communication in the articulation process needs to be open, clear, and frequent. Communication needs to take place between the different levels, between counterparts in the different organizations, and vertically between members of the same institution. without participants knowing about and supporting the articulation effort, it can't be successful.

7. *Modest Initial Goals*

Let's do it right the first time! Start small and build. The easiest place to start is with a vocational/technical program where faculty members are open to change.

Concentrate administrative efforts and resources toward only one or two program areas at a time to do the job well. The success and benefits from that first established articulated program will convince other departments to participate.

8. *Accountability*

Someone must be assigned the responsiblity for articulation. The coordinating districts could jointly fund a single coordinator, or each district could assign a separate person at each level. Instructional staff must have clearly defined responsibilities, and those who are coordinating the effort must clearly understand these responsibilities.

9. *Competency-Based Curricula*

Build competency-based curricula. Programs are easier to understand and to articulate when coursework and learning activities are built around the competencies to be learned and developed. With a competency-based curricula, instructors and curriculum people can better coordinate the educational experiences for students. A competency-based curriculum provides instructors the opportunity to have a common approach and a common language for planning.

10. *A Common Focus on Mutual Goals Rather Than On Individual Turf*

Make the student the top priority. Focus on goals, not on turf. Participants must be willing to work for the common good instead of to their own advantage. Start with issues that both institutions can agree upon and build on these. If turf problems occur, concentrate on the common goals and the good of the student. Compromise is the key. Compromising does not mean losing. Everyone wins through articulation.

Appendix Q
Sample Institutional and Program Articulation Agreements

SAMPLE ARTICULATION AGREEMENT

AGREEMENT FOR THE ARTICULATION OF CURRICULA BETWEEN PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE STATE AREA VOCATIONAL SCHOOLS ROANE STATE COMMUNITY COLLEGE AND KNOX COUNTY SCHOOLS

In mutual recognition of the value of training offered at each institution, Knox County Schools do hereby enter into this Articulation Agreement. This Agreement establishes those parameters which are necessary for the coordination of educational programs and which will facilitate the orderly progression of students from one level to the other without unnecessary duplication of course content.

To implement the Agreement, representatives of the post-secondary institutions have jointly established definitive sets of criteria to govern the awarding of credits for courses that meet post-secondary standards. Advanced standing will be validated by the post-secondary institutions. Validation may take the form of certification by secondary instructors, personal interview, or proficiency testing (written or performance).

No tuition is to be assessed for transfer credits awarded to students under terms of the Agreement. If upon enrollment at the post-secondary institution the student does not progress as expected in the more advanced classes, the school has the right to place the student in the beginning classes.

All institutions agree to take whatever actions are necessary to insure that faculty members, counselors, admissions personnel, and other affected by the Agreement are knowledgeable concerning its contents and are skilled in interpreting it to students.

This Agreement shall become operational on the date signed and shall be subject to annual review and modification by arrangement of the signatories or their duly appointed successor. During the agreement period, each contracting party shall notify the other of any change which affects courses or the methods of exemption. When such changes are made, it is understood that the Agreement will be subject to review and modification.

Authorized Signatures:

Chairman, Board of Education Knox County Schools	Date	Superintendent Knox County Schools	Date
President, Roane State Community College	Date	President, Pellissippi State Technical Community College	Date

Directors, State Area Vocational-Technical Schools

Knoxville State Area Vocational-Technical School	Date
Harriman State Area Vocational-Technical School	Date
Jacksboro State Area Vocational-Technical School	Date
Athens State Area Vocational-Technical School	Date
Oneida State Area Vocational-Technical School	Date
Crossville State Area Vocational-Technical School	Date

2 + 2 PROGRAM ARTICULATION AGREEMENT BETWEEN LANE COMMUNITY COLLEGE AND LANE COUNTY HIGH SCHOOLS

ELECTRICITY/ELECTRONICS

LCC Department:
Electronics

LCC Courses:
Opportunities in Technology
Electrical Theory 1
Digital Electronics 1
Shop Practices for Electronics
Engineering Problems 1 (math)
Beginning Algebra
Electrical Theory 2
Digital Electronics 2
Active Circuits 1
Elementary Algebra
Beginning Programming
Intermediate Algebra
Note: Courses may be challenged in numbered sequence only.

Type of Articulation:
Course Challenge/Waiver

Credit Possible:
1-40 credits

LCC Reference Materials:
Program Option Sheets
Related Occupations List

LCC Responsibility:
Provide course materials to high school teachers
Make final evaluation on credit challenge or waiver

High School: _____

High School Courses in 2 + 2 Curriculum:
_____
_____
_____
_____

Student Responsibility:
Obtain permission from high school teacher and LCC Department Chair to challenge or waive a class
Study course materials provided by high teacher
Complete test with 70% or better score

High School Vocational-Technical Teacher Responsibility:
Provide student with a course outline, study preparation materials, a test date, testing and evaluation for LCC course
Submit a report to LCC on test results

_____
LCC Dean of Vocational Education

_____
High School Principal

_____
LCC Department Chair

_____
High School Vo-Tech Teacher

_____
Date

MEMORANDUM OF INTENT FOR ADVANCED PLACEMENT
BETWEEN
THE YAKIMA VALLEY VOCATIONAL SKILLS CENTER
AND
WASHINGTON COMMUNITY COLLEGE DISTRICT 16

This memorandum of intent is designed to reflect the mutual intention and purpose of the Yakima Valley Vocational Skills Center and Yakima Valley Community College to articulate and coordinate related vocational programs for the purpose of providing an advanced placement option. In order to facilitate Skills Center students entering Yakima Valley Community College with advanced standing, articulation agreements will be entered into based on criterion measures jointly developed and agreed upon by faculty and approved by appropriate administrative representatives of each institution.

It is further intended that the Yakima Valley Vocational Skills Center and Yakima Valley Community College will continue to cooperate in the development of additional program agreements, to the end that many vocational programs at the Skills Center will transfer to related programs provided at Yakima Valley Community College.

A review for program by program articulation is intended to be ongoing. Each institution will continually update criterion measures as appropriate.

Either the Yakima Area Vocational Skills Center or Washington Community College District 16 may terminate further performance under Agreement at any time by notifying the other party in writing at least one academic year in advance of the effective date of termination specified in such notice.

Dr. Terrance R. Brown, President
Yakima Valley Community College

Dr. Warren Dean Starr, Superintendent
Yakima School District #7

Dr. Gerald Perryman, Dean of Instruction
Yakima Valley Community College

Dr. Robert McLaughlin, Director
Yakima Valley Vocational Skills Center

Mr. Gary Dietzen, Director
Yakima Valley Vocational Cooperative

ARTICULATION AGREEMENT 1987-88

ABERDEEN HIGH SCHOOL AND GRAYS HARBOR COLLEGE
BUSINESS EDUCATION/SECRETARIAL SCIENCE

Based upon recognition of skills and knowledge gained by Aberdeen High School students who have successfully completed certain vocational courses as high school sophomores, juniors and seniors, and in an effort to reduce duplication of effort in providing effective instruction at the high school and community college levels, the following are statements to which we mutually subscribe.

1. Students who have fulfilled the instructional/performance objectives within Grays Harbor College's Secretarial Science program, based on Aberdeen High School's secondary level courses in the Business Education program, will be given advanced placement credit for a maximum of 13 credits in the Secretarial Science program at Grays Harbor College. Any course or combination of courses listed below can be applied for credit in the Secretarial Science program, not to exceen 13 college credits, providing the conditions in statements numbers 2 thru 7, following, are met.

ABERDEEN HIGH SCHOOL COURSES*	GRAYS HARBOR COLLEGE COURSES*
Office Machines	BA 115 Adding & Calc. Machines (3 cr.
Typing/Keyboarding I	BA 110 Keyboarding (3 c
Typing/Keyboarding II	BA 111 Beginning Typewriting (3 cr.
Advanced Typing/Word Processing	BA 112 Beginning Typewriting (3 c and BA 161 Word Processing (1 c

*Official title changes for the course titles listed will be acceptable substitutes.

2. Only those students who graduate or complete business education courses in the high school during the 1987-88 year will be eligible for advanced placement in the College's Secretarial Science program under the terms of this agreement. High school students must enter the College program within two years of graduation from high school in order to be granted advance placement credit for high school business education courses successfully completed (as shown on student's high school transcript). (For example, June 1988, graduates must enroll in the college program no later than Fall Quarter, 1990.)

3. This articulation agreement will be in effect for the 1987-88 academic year. Subsequent agreements will be negotiated annually. Students must be enrolled in the College's Secretarial Science program for at least one academic quarter before receiving advanced placement credit. The advanced placement credit will appear on the student's college transcript at the end of his/her second quarter in the College's Secretarial Science program.

   Advanced placement credit given for Aberdeen High School courses is contingent upon the ability of students to earn a grade of "C" or better in the next higher college course, in a sequence, attempted at GHC.

   In situations where there are no additional required courses in a sequence, an <u>average</u> grade of "C" or better in all Business Administration courses attempted during the first quarter of enrollment at GHC will be required to allow individual students to receive any advanced placement credit.

Advanced placement credit will be identified as transferred high school credit under an articulation agreement. Advanced placement credit awarded cannot be transferred to an alternate GHC program.

4. The grade on the College transcript will be the same grade the student received in the High School equivalent course. If the articulated high school course credit is from a series of two or more courses completed, the grade earned in the last course of the sequence will be the grade recognized on the college transcript (general statement not applicable in 1987-88.)

5. Students must receive a grade of "B" (3.0...80%) or better in the identified high school course(s) in order to be granted advanced placement credit for the college equivalent courses(s).

6. Students must meet all regular College admission requirement in effect at the time of admission to the College and enrollment in the college program.

7. Should a student intending to receive credit under this agreement fail to make satisfactory progress in a course, the student may be required to actually enroll in the intended transfer credit course at the discretion of the college faculty.

8. The designated high school and college instructors will meet as necessary to discuss any particular problems as they arise in the articulation of credit. Minor revisions can be made via telephone calls or correspondence.

9. High School and College Administrators will meet as necessary to revise or discuss the articulation agreement. Minor revisions can be made via phone calls or correspondence. Administrators will be responsible for arranging additional necessary meetings involving both instructors and administrators.

10. High School and College administrators will devise a follow-up procedure to determine the success of students who receive advanced placement credit for high school level business education courses successfully completed.

ABERDEEN HIGH SCHOOL	GRAYS HARBOR COLLEGE
Superintendent	President
Principal	Vice President for Instruction
Vocational Director	Associate Dean for Vocational Education
Department Chairman	Division Chairman

ARTICULATION AGREEMENT
BETWEEN
EASTERN IOWA COMMUNITY COLLEGE DISTRICT
AND
DAVENPORT COMMUNITY SCHOOL DISTRICT

The purpose of this articulation agreement is to provide a mechanism that will enable high school graduates from the Davenport Community School District to transfer to colleges (Clinton, Muscatine, and Scott Community Colleges) of the Eastern Iowa Community College District and receive credit for competencies learned at the secondary level.

We support the concept of articulation so that students can make a smooth transition from secondary level to postsecondary level without experiencing delays or duplication of learning.

We encourage the administration and faculty of both school districts to develop program/course articulation agreements and to add them to this agreement.

Davenport Community School District	Eastern Iowa Community College District
Date	Date

ACCOUNTING PROGRAM
ARTICULATION AGREEMENT
BETWEEN
EASTERN IOWA COMMUNITY COLLEGE DISTRICT
AND
DAVENPORT COMMUNITY SCHOOL DISTRICT

The Eastern Iowa Community College District (EICCD), comprising the colleges of Clinton Community College (CCC), Muscatine Community College, (MCC), and Scott Community College (SCC), agrees to grant advanced standing or credit to students completing accounting courses at Davenport North High School of the Davenport Community School District who wish to complete the program in Accounting Technology (AT) at SCC.

SECTION A

The following criteria must be met in order for the students to receive college credits or course waiver:

1. Students shall complete the four semester sequence of Accounting I and II with a grade of "B" or better for each semester.

2. Students must enroll in the Accounting Technology Program and request college credit or waiver within two years after graduating from Davenport North High School.

   If the above requirements are fully satisfied, then SCC will:

   a. Grant college credit at SCC for ACCT: 102 Principles of Accounting I (AT). In order to receive credit, students must pay the established recording fee. Courses will then be posted to the student transcript with a grade of "T" (Test Out).

   - OR -

   b. Grant advanced standing into the SCC Accounting Technology Program by waiving ACCT: 102 Principles of Accounting I (AT).

SECTION B

Students not meeting the requirements in Section A and following under the following criteria may obtain credit in the ways listed.

1. Completion of a semester(s) with a grade lower than a "B".

2. Completion of four semesters of high school accounting with a grade of "B" or better, but beyond two years since graduating from Davenport North High School.

   SCC will:

   a. Provide competency-based assessment that will allow individuals the opportunity to "test out" of ACCT: 102 Principles of Accounting I (AT). Based on the results of the assessment, the College may grant credit upon payment of the established test-out and recording fees, or the Accounting Technology faculty may recommend appropriate action to enable a student to master the current course competencies.

SECTION C

Implementation of this agreement is scheduled for Fall 1989 and is subject to annual review. This annual review will ensure that each institution will inform the other of any change in the relevant curriculum.

Davenport Community School District	Eastern Iowa Community College District
Date _____	Date _____

Appendix R
Action Steps and Process Flow Chart

ACTION STEPS FOR SUCCESSFUL ARTICULATION

Finally, perhaps a key tension for some open-door community colleges is that they have side-stepped the need to work closely with high schools and to state clearly their own preparation expectations for high school students. If they are to have the best chance for success in a community college, high school students must have a clear sense of what it will take to succeed. Yet, most young people hold only vague notions of what adequate preparation for a community, technical, or junior college experience means. In the great haste to separate themselves from high schools, too many community colleges have weakened or nearly severed the high school-community college connection.

Dale Parnell, *The Neglected Majority*

1. Take the Initiative

"It's like a K-14 program in action."

The question, "who's on first?" doesn't seem to matter, according to Washington educators who have been successful in sealing articulation agreements. Sometimes the lead is taken by the community college; in other cases it has been the secondary schools who took the first step in exploring possible joint efforts. Either way, someone has to think about these questions:

- What institutions will benefit from these discussions?
- Who are the key players in each system?

2. Schedule a Planning Meeting

"It's tough, but worth doing."

The agenda for subsequent planning meetings can be relatively simple, but should include:

- Identifying other organizations who might benefit
- Establishing broad goals
- Developing a timeline and listing tasks
- Setting annual goals, requiring at least a two-hour meeting

3. Secure Validation of Chief Executive Officers

"After top administrators signed off on the process, we began to do some writing based on the community college format."

Successful articulation ultimately requires the policy-level approval of the chief executives at each institution and the endorsement of each board of directors. A policy statement inserted into the formal decision-making process for each agency will give credence to all remaining steps.

Even institutions that have taken the more informal approach to articulation may eventually choose to have a set of written policies to guide staff who follow them in the future.

4. Develop Coordinating Mechanisms

"The Articulation Council provided impetus."

A planning team comprised of interested staff from each partner institution then begins the slow but sure process of building new alliances:

- Some have chosen to identify one person to serve as coordinator; others have used a third-party facilitator to gather information and bring key parties together. Someone will need to be responsible for developing an annual work plan that specifies who does what with whom and when.

"We looked for program areas where the beginning portions of our programs matched up well with the offerings at the high schools."

- This is the group that needs to identify likely program areas that will be tackled first.
- The team must also come up with a format for a prototype agreement that might fit the local situation (see Attachment C).
- This work group also clears the way for faculty to spend released time reviewing each other's programs and building a common understanding of desired competencies students should encounter.
- The "articulation council" must also establish mechanisms for maintaining consistent communication.
- Finally, this steering committee needs to document all meetings and decisions to maintain a formal record of progress.

"One of the secrets was figuring out a way for teachers to visit each other's classes."

5. Orient Staff Members of Participating Organizations

"We started with Business Education because it was easy and everyone was ready."

It will be up to the middle managers in each institution to orient their staff to the possibilities of articulation:

- Emphasize the policy-level commitment of the chief executives and the respective boards.
- Describe the process and the proposed products.
- Provide adequate and detailed instructions and models to follow.
- Identify a facilitator for "discipline" meetings.
- Clarify how instructor initiative enhances the possibility of success.

6. Arrange Interagency Work Sessions

"Released time for staff was important."

Cooperating instructors will need to work out details of curriculum offerings, course sequences, competency lists and standards of performance. This comes through opportunities to visit each other's campuses, review goals and objectives, and discuss instructional strategies and resources.

The dialogue between the secondary and postsecondary programs can be initiated by either partner.

Items that might be covered:

- What is the history of advanced placement at the college?
- Have students from the school district been placed previously?
- What are the expectations of the high school staff?
- What are the expectations of the college staff?
- What is the current process for a student to be placed into a class through waivers of prerequisites or for that student to receive credit for skill/competency attainment?

"Alternative planning meetings between the college and high school worked well."

"The instructors shall be the ones who decide if credit will be granted, not the counselors who don't know the curriculum."

- Describe the curriculum of the current high school program: topics covered, daily allotment of time to lab and to theory, texts used, method of determining proficiency (e.g., skills list or grades). Note: The college instructor may need time to review the curriculum and report back at a subsequent meeting.
- Define the steps to be taken for a student (in the vocational area under discussion) to receive advanced placement.
- Establish timeline for completion of the agreement.
- Set subsequent meeting if indicated.

Note: It will be helpful if one person assumes the role of keeping minutes of the meetings and then distributes the minutes to participants within three days. A record is then available for reference should questions arise. Future dialogue can be facilitated where such documentation is available.

"Their Health Occupations program makes our kids take a test they wrote using their equipment and staff. Because of the implication that our program is not good, a lot of our students go elsewhere."

- Staff then need to list the matches and mismatches that may emerge as secondary/postsecondary curricula are compared.
- If a system of validating or certifying competence is to be used, then all must understand how it will work.
- Middle managers will need to carefully review possible financial implications of each decision, particularly the likely impact on student costs.

7. Complete Draft Agreements

The steering committee needs to decide if the draft agreements will need to be presented to each board for approval or if administrative approval will be sufficient.

8. Publicize the Articulation Agreements

"The signatures on the agreements are a symbolic tie."

Participating institutions will need to make public their articulation agreements:

- A public signing ceremony has been popular in several communities, complete with press coverage and souvenir pens.
- At a minimum, district newsletters going to staff and parents should highlight the new opportunities students will enjoy as a result of the articulation process.

- Sitting down with building principals and counselors seems to be one effective activity to assure success.

9. Implement the Process

As participants work to implement articulation of programs, gathering and sharing information remain important:

- Each secondary teacher must become an enthusiastic advocate for the process that has emerged.
- Particular attention should be given to sharing the new program options at the middle and junior high school levels as students begin to forecast their four-year plans.
- Data on the students who beging to take advantage of the system need to be accumulated for program refinement and reporting.

"What we still need are pathways for students to see how their program builds from the junior high on up."

10. Review Process Annually

A determination needs to be made about what will happen when a key staff member--particularly a teacher--leaves one of the partner institutions and a new person comes in with no understanding of the articulation arrangements.

"When key faculty leave, impetus can change."

EDMONDS COMMUNITY COLLEGE/EDMONDS SCHOOL DISTRICT DEVELOP VARIETY OF COOPERATIVE VENTURES

These two agencies have collaborated on several projects in addition to program articulation:

1. Shared Use Of Facilities

The culinary programs for both the high schools and college now operate with one "laboratory" but separate teachers and curriculum emphases. Discussions are also being held on combining district and college early childhood programs into one facility—perhaps a remodeled former elementary school in the south Snohomish County area.

2. Membership on Each Other's Advisory Committees

School district and community college staff sit on each institution's advisory committes in such areas as business and office education, early childhood programs, computer information systems, and horticulture. The two agencies decided to form one Culinary Arts Council to serve both programs.

3. Programs to Address Emerging Needs

The college and school district created a "youth at risk" intervention called Contracted Learning at Individual Pace (CLIP) which was initially housed at ECC and is now also available at three high schools with interest in developing other such collaborative efforts.

4. Cooperative Projects and Services

A cooperative Summer Music School started with 65 students and has blossomed to 178 students. The district and college jointly sponsored a tour of the Tucson Boys Choirs in February, 1988. Also under exploration are concerts, workshops and clinics involving the music staffs of both the district and the college.

5. College Sponsorship of a Single Program Area

The school district is considering the possibility of merging its new "health care professions" curriculum with the college's Social and Human Services Department offerings in gerontology or home health aide.

6. Dual Enrollment Opportunities

The college is offering a 3-credit course in international trade that is designed for both high school and community college students. In this example, Shoreline School District is also involved.

ACTION STEPS FOR ARTICULATION

The following action steps will help educators apply these 10 principles in developing articulation systems and articulated curricula. Although they appear in a logical order, they do not have to be accomplished in any particular progression. The steps are specific, but at the same time general enough to apply to different models of articulation in different educational settings.

•Identify the need for and benefits of articulating with other educational institutions in your area.

•Identify other educational institutions that would benefit from articulating with your school or college.

•Meet with CEOs of these organizations.

•Involve the chief instructional officers and vocational directors in these meetings.

•Establish the goals to be achieved through articulation.

•Develop written articulation agreements for execution at the institutional level and between program departments.

•Select one or two program areas that appear amenable, where faculty members have established relationships, and that have a particular need for articulation. Once these program areas are successfully articulated and the benefits visible, use these successes to get other occupational departments participating in articulation.

•Involve all faculty from the beginning in the articulating departments in planning and developing the system and the curricula.

•Involve guidance counselors in the articulation planning to get their suggestions and support and to keep them informed.

•Establish clear communication vehicles within your institution and between and among institutions.

•Make clear communication vehicles within your institution and between and among institutions.

•Make clear to those within your institution that articulation is an institutional priority.

•Provide released time to teachers for meetings and for curriculum development or revision.

•Select an articulation coordinator jointly funded by participation g institutions, or give someone in each institution the responsibility for articulation and time to do the job.

•Provide secretarial support for the articulation coordinator and faculty.

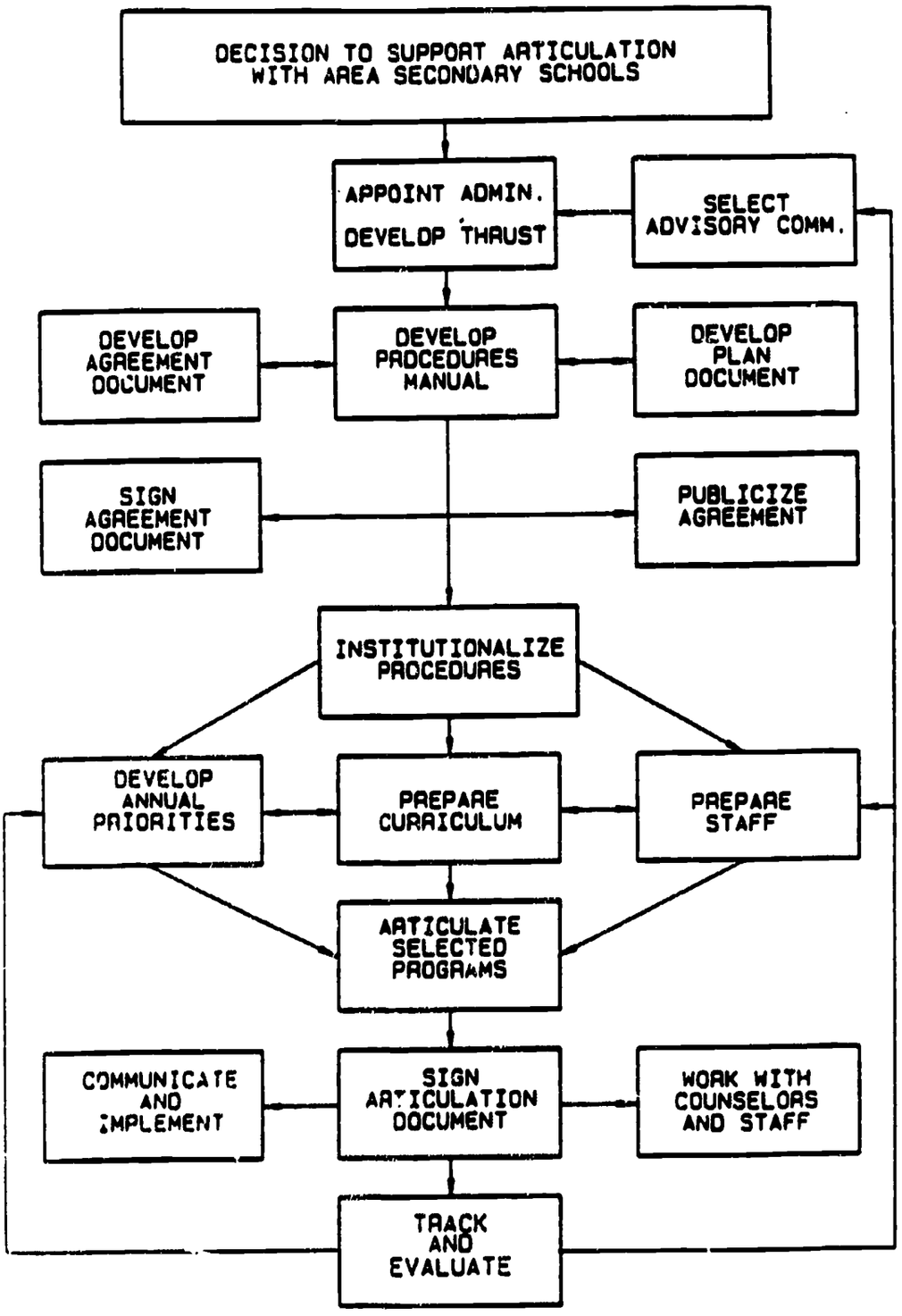
•Establish a system for certifying competencies or educational accomplishments of students in articulated courses for students to use when they apply for credit at the next educational level.

•Publicize the articulation arrangement and programs to students, parents, and employers.

•Establish a system for reviewing, evaluating, and revising the articulation system and the articulated curricula.

The preceding list of action steps can be used as a checklist as well as a guide when undertaking articulation. The challenges of the process are many, but they are outweighed by the benefits to the students, educational institutions, and employers.

EXAMPLE ARTICULATION PROGRAM FLOW CHART



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Appendix S
Sample Mission Statement

INTRODUCTION

ARTICULATION: A COOPERATIVE PARTNERSHIP

MISSION STATEMENT

Articulation is a cooperative partnership process used in cultivating excellence in education. Articulation involving high schools, ROPs, adult schools, the community college, and industry is one example of a cooperative effort providing continuity and coherence to a student's education. Articulation focuses on revitalizing our educational system through placing high value upon cultivating excellence and upon the full development of our human resources.

The utilization of articulation will provide for the student meaningful access to and success in both secondary and post secondary educational programs through facilitating the development of life-long learners competent in basic skills, critical thinking, and problem solving at both the theoretical and practical levels.

It is imperative that high schools, ROPs, adult schools, and colleges become aggressive in examining, developing, and sustaining quality educational programs and updating and upgrading curriculums to meet the needs of a technological world. The articulation process provides a means of achieving this goal.

Appendix T
Tech Prep Education Act of 1990

"(F) to strengthen coordination between vocational education programs, and the labor and skill needs of business and industry;

"(G) to address the economic development needs of the area served by the partnership;

"(H) to provide training and career counseling that will enable workers to retain their jobs;

"(I) to provide training and career counseling that will enable workers to upgrade their jobs; and

"(J) that address the needs of new and emerging industries, particularly industries in high-technology fields.

"(2) the State will give preference to partnerships that coordinate with local chambers of commerce (or the equivalent), local labor organizations, or local economic development plans;

"(3) the State will give priority to programs offered by partnerships that provide job training in areas or skills where there are significant labor shortages;

"(4) the State shall ensure an equitable distribution of assistance under this part between urban and rural areas;

"(5) except as provided in paragraph (6), not less than 50 percent of the aggregate cost of programs and projects assisted under this part will be provided from non-Federal sources, and not less than 50 percent of such non-Federal share will be provided by businesses or labor organizations participating in the partnership; and

"(6) in the event that the partnership includes a small business or labor organization, 40 percent of the aggregate cost of the programs and projects assisted under this part will be provided from non-Federal sources and not less than 50 percent of such non-Federal share will be provided by participating businesses or labor organizations."; and

(3) by adding at the end the following new subsection:

"(d) The Secretary shall prescribe policies for vocational education programs carried out with assistance under this part. Such policies shall include examples of allowable expenses for business-labor-education partnerships.".

SEC. 308. TECH-PREP EDUCATION.

Title III of the Act (20 U.S.C. 2351 et seq.) is amended by adding at the end the following new part:

"PART E—TECH-PREP EDUCATION

"SEC. 341. SHORT TITLE.

"This part may be cited as the 'Tech-Prep Education Act'.

"SEC. 342. FINDINGS AND PURPOSE.

"(a) FINDINGS.—The Congress finds that—

"(1) rapid technological advances and global economic competition demand increased levels of skilled technical education preparation and readiness on the part of youths entering the workforce;

"(2) effective strategies reaching beyond the boundaries of traditional schooling are necessary to provide early and sustained

intervention by parents, teachers, and educational institutions in the lives of students;

"(3) a combination of nontraditional school-to-work technical education programs, using state-of-the-art equipment and appropriate technologies, will reduce the dropout rate for high school students in the United States and will produce youths who are mature, responsible, and motivated to build good lives for themselves;

"(4) the establishment of systematic technical education articulation agreements between secondary schools and postsecondary educational institutions is necessary for providing youths with skills in the liberal and practical arts and in basic academics, including literacy instruction in the English language, and with the intense technical preparation necessary for finding a position in a changing workplace;

"(5) by the year 2000 an estimated 15,000,000 manufacturing jobs will require more advanced technical skills, and an equal number of service jobs will become obsolete;

"(6) more than 50 percent of jobs that are developing will require skills greater than those provided by existing educational programs;

"(7) dropout rates in urban schools are 50 percent or higher, and more than 50 percent of all Hispanic youth drop out of high school; and

"(8) employers in the United States pay an estimated $210,000,000,000 annually for formal and informal training, remediation, and lost productivity as a result of untrained and unprepared youth joining, or attempting to join, the workforce of the United States.

"(b) PURPOSE.—It is the purpose of this part—

"(1) to provide planning and demonstration grants to consortia of local educational agencies and postsecondary educational institutions, for the development and operation of 4-year programs designed to provide a tech-prep education program leading to a 2-year associate degree or a 2-year certificate; and

"(2) to provide, in a systematic manner, strong, comprehensive links between secondary schools and postsecondary educational institutions.

"SEC. 343. PROGRAM AUTHORIZED.

"(a) DISCRETIONARY AMOUNTS.—In any fiscal year in which the amount made available under section 3(d)(1)(E) to carry out the provisions of this part is equal to or less than $50,000,000, the Secretary, in accordance with the provisions of this part which are not inconsistent with this paragraph, shall award grants for tech-prep education programs to consortia of—

"(1) local educational agencies, intermediate educational agencies or area vocational education schools serving secondary school students, or secondary schools funded by the Bureau of Indian Affairs; and

"(2)(A) nonprofit institutions of higher education which offer a 2-year associate degree program, a 2-year certificate program, and which are qualified as institutions of higher education pursuant to section 481(a) of the Higher Education Act of 1965,

including institutions receiving assistance under the Tribally Controlled Community College Assistance Act of 1978, or a 2-year apprenticeship program that follows secondary instruction, if such nonprofit institutions of higher education are not subject to a default management plan required by the Secretary; or

"(B) proprietary institutions of higher education which offer a 2-year associate degree program and which are qualified as institutions of higher education pursuant to section 481(a) of the Higher Education Act of 1965 if such proprietary institutions of higher education are not subject to a default management plan required by the Secretary.

"(b) STATE GRANTS.—(1) In any fiscal year for which the amount made available under section 3(d)(1)(E) to carry out the provisions of this part exceeds $50,000,000, the Secretary shall allot such amount to the States in accordance with the provisions of section 101(a)(2).

"(2) From amounts made available to each State under paragraph (1), the State board, in accordance with the provisions of this part which are not inconsistent with this paragraph, shall award grants on a competitive basis or on the basis of a formula determined by the State board, for tech-prep education programs to consortia described in subsection (a)(1).

"SEC. 344. TECH-PREP EDUCATION PROGRAMS.

"(a) GENERAL AUTHORITY.—Each grant recipient shall use amounts provided under the grant to develop and operate a 4-year tech-prep education program.

"(b) CONTENTS OF PROGRAM.—Any such program shall—

"(1) be carried out under an articulation agreement between the participants in the consortium;

"(2) consist of the 2 years of secondary school preceding graduation and 2 years of higher education, or an apprenticeship program of at least 2 years following secondary instruction, with a common core of required proficiency in mathematics, science, communications, and technologies designed to lead to an associate degree or certificate in a specific career field;

"(3) include the development of tech-prep education program curricula appropriate to the needs of the consortium participants;

"(4) include in-service training for teachers that—

"(A) is designed to train teachers to effectively implement tech-prep education curricula;

"(B) provides for joint training for teachers from all participants in the consortium; and

"(C) may provide such training in weekend, evening, and summer sessions, institutes or workshops;

"(5) include training programs for counselors designed to enable counselors to more effectively—

"(A) recruit students for tech-prep education programs;

"(B) ensure that such students successfully complete such programs; and

"(C) ensure that such students are placed in appropriate employment;

"(6) provide equal access to the full range of technical preparation programs to individuals who are members of special pop-

ulations, including the development of tech-prep education program services appropriate to the needs of such individuals; and

"(7) provide for preparatory services which assist all participants in such programs.

"(c) ADDITIONAL AUTHORIZED ACTIVITIES.—Each such program may—

"(1) provide for the acquisition of tech-prep education program equipment; and

"(2) as part of the program's planning activities, acquire technical assistance from State or local entities that have successfully designed, established and operated tech-prep programs.

"SEC. 345. APPLICATIONS.

"(a) IN GENERAL.—Each consortium that desires to receive a grant under this part shall submit an application to the Secretary or the State board, as appropriate, at such time and in such manner as the Secretary or the State board, as appropriate, shall prescribe.

"(b) THREE-YEAR PLAN.—Each application submitted under this section shall contain a 3-year plan for the development and implementation of activities under this part.

"(c) APPROVAL.—The Secretary or the State board, as appropriate, shall approve applications based on their potential to create an effective tech-prep education program as provided for in section 344.

"(d) SPECIAL CONSIDERATION.—The Secretary or the State board, as appropriate, shall give special consideration to applications which—

"(1) provide for effective employment placement activities or transfer of students to 4-year baccalaureate degree programs;

"(2) are developed in consultation with business, industry, and labor unions; and

"(3) address effectively the issues of dropout prevention and re-entry and the needs of minority youths, youths of limited English proficiency, youths with handicaps, and disadvantaged youths.

"(e) EQUITABLE DISTRIBUTION OF ASSISTANCE.—In making grants under this part, the Secretary shall ensure an equitable distribution of assistance among States and the Secretary or the State board, as appropriate, shall ensure an equitable distribution of assistance between urban and rural consortium participants.

"(f) NOTICE.—(1) In the case of grants to be made by the Secretary, each consortium that submits an application under this section shall provide notice of such submission and a copy of such application to the State educational agency and the State agency for higher education of the State in which the consortium is located.

"(2) The Secretary shall notify the State educational agency, the State agency for higher education, and the State council on vocational education of any State each time a consortium located in such State is selected to receive a grant under this part.

"SEC. 346. REPORTS.

"(a) REPORT TO THE SECRETARY.—In the case of grants made by the Secretary, each grant recipient shall, with respect to assistance received under this part, submit to the Secretary such reports as may be required by the Secretary to ensure that such grant recipient is complying with the requirements of this part.

"(b) REPORT TO THE CONGRESS.—After grant recipients who receive grants in the first year in which grants are made under this part complete their eligibility under the program, the Secretary shall submit to the Congress a report evaluating the effectiveness of the program under this part.

"SEC. 347. DEFINITIONS.

"For purposes of this part:

"(1) The term 'articulation agreement' means a commitment to a program designed to provide students with a nonduplicative sequence of progressive achievement leading to competencies in a tech-prep education program.

"(2) The term 'community college'—

"(A) has the meaning provided in section 1201(a) of the Higher Education Act of 1965 for an institution which provides not less than a 2-year program which is acceptable for full credit toward a bachelor's degree; and

"(B) includes tribally controlled community colleges.

"(3) The term 'tech-prep education program' means a combined secondary and postsecondary program which—

"(A) leads to an associate degree or 2-year certificate;

"(B) provides technical preparation in at least 1 field of engineering technology, applied science, mechanical, industrial, or practical art or trade, or agriculture, health, or business;

"(C) builds student competence in mathematics, science, and communications (including through applied academics) through a sequential course of study; and

"(D) leads to placement in employment.

"(4) The terms 'institution of higher education' and 'higher education' include institutions offering apprenticeship programs of at least 2 years beyond the completion of secondary school.".

SEC. 309. SUPPLEMENTARY STATE GRANTS FOR FACILITIES AND EQUIPMENT AND OTHER PROGRAM IMPROVEMENT ACTIVITIES.

Title III of the Act (as amended by section 308 of this Act) (20 U.S.C. 2351 et seq.) is further amended by adding at the end the following new part:

"PART F—SUPPLEMENTARY STATE GRANTS FOR FACILITIES AND EQUIPMENT AND OTHER PROGRAM IMPROVEMENT ACTIVITIES

"SEC. 351. STATEMENT OF PURPOSE.

"It is the purpose of this part to provide funding to local educational agencies in economically depressed areas for program improvement activities, especially the improvement of facilities and acquisition or leasing of equipment to be used to carry out vocational education programs that receive assistance under this Act.

"SEC. 352. ALLOTMENT TO STATES.

"In each fiscal year, from any amounts appropriated for purposes of carrying out this part, the Secretary shall allot to each State an amount which bears the same ratio to such appropriated amounts as the aggregate amount allocated to counties in such State for such